

**IN THE UNITED STATES DISTRICT COURT FOR THE
EASTERN DISTRICT OF MISSOURI
SOUTHEASTERN DIVISION**

THE STATE OF MISSOURI,)
ex rel. ANDREW T. BAILEY, in his official)
capacity as Missouri Attorney General,)
)
Plaintiff,)

Case No. 1:20-cv-00099-SNLJ

v.)
)

THE PEOPLE’S REPUBLIC OF CHINA,)
THE COMMUNIST PARTY OF CHINA,)
NATIONAL HEALTH COMMISSION)
OF THE PEOPLE’S REPUBLIC OF)
CHINA, MINISTRY OF EMERGENCY)
MANAGEMENT OF THE PEOPLE’S)
REUBLIC OF CHINA, MINISTRY OF)
CIVIL AFFAIRS OF THE PEOPLE’S)
REPUBLIC OF CHINA, PEOPLE’S)
GOVERNMENT OF HUBEI)
PROVINCE, PEOPLE’S GOVERNMENT)
OF WUHAN CITY, WUHAN INSTITUTE)
OF VIROLOGY, and CHINESE)
ACADEMY OF SCIENCES,)
)
Defendants.)

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Exhibit 1

“A COMPLEX AND GRAVE SITUATION”

A POLITICAL CHRONOLOGY OF THE
SARS-COV-2 OUTBREAK



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Senator Rubio is grateful for the staff, fellows, and outside experts who worked for countless months to connect the dots.

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"A COMPLEX AND GRAVE SITUATION"

This report draws on numerous sources published in English and Chinese to examine the posture taken by the authorities of the People's Republic of China (PRC) toward biosecurity, biosafety, and public health starting from 2018 until 2021. Its primary focus is on tracing the authorities' response to the emergence of SARS-CoV-2, the virus that causes COVID-19, as it progressed from a localized outbreak to a national epidemic to a full-fledged pandemic.

Many of the matters described in the chronology have appeared in reporting elsewhere, but their significance is illuminated anew when analyzed chronologically and collectively. Considerable information gleaned from Chinese language sources appears here for the first time, shedding much needed light on key questions and providing new context to the existing body of reporting. An extensive background section is included before the chronology to aid the reader in understanding the political, economic, and security backdrop against which the initial outbreak occurred in China. To be clear, it is the aggregate picture that emerges from this report – not any particular piece of information standing as a proverbial “smoking gun” – which matters most when assessing the origin question.

Beijing's efforts to render imperceptible the exact timing and original cause of the initial outbreak of SARS-CoV-2 are what necessitated this study. As its refusal to cooperate fully with the World Health Organization (WHO) has shown, Beijing's efforts to keep these facts well beyond the world's reach continue unabated. Scientists have not yet succeeded at tracing the origin because they have been denied access to the data that would facilitate a retrospective study of its genomic epidemiology. The epidemiological data released by the Chinese Communist Party (CCP) appears to have been curated to create an informational maze that leads to perpetual puzzlement. As long as we approach the origin as an inherently scientific question to be answered solely by the methods of science, we empower the CCP to keep hiding the data that would most readily satisfy the evidentiary standards of science.

It is not the limits of science that constrain our understanding of the origin of SARS-CoV-2. It was the political decision to block scientists from accessing the clinical and genomic data that would have allowed them to methodically reconstruct what happened. For this reason, we approached the origin question as a political puzzle, first and foremost, with a scientific component that is important, but not decisively so. This report borrowed a legal standard – the preponderance of the evidence – to assess what we know at this juncture, using the admittedly incomplete information we have available. Whatever its limitations, we trust that most readers will judge this report to be a useful contribution to the search for answers and accountability.

The following questions served as the frame of reference for this report:

- Prior to the pandemic, were biosafety conditions at laboratories studying bat coronaviruses in Wuhan subpar and potentially dangerous? If so, were the managers of these labs aware of such problems?
- Were senior leaders in the ruling CCP and PRC government concerned about biosecurity and biosafety as general matters, and/or particularly concerned about the biosafety conditions at laboratories studying bat coronaviruses in Wuhan?
- Is there evidence that a laboratory incident occurred in Wuhan concurrent with the initial outbreak of SARS-CoV-2 in 2019?
- When did the CCP leadership at the local and central levels first become aware that there was an outbreak of infectious disease? Did they know it was caused by a novel pathogen? If so, did they suspect a zoonotic spillover or a laboratory incident was most likely responsible for that outbreak?

SUMMARY OF FINDINGS

This study identified a variety of significant indicators that the PRC authorities and relevant figures in the scientific community possessed some level of awareness of an outbreak of infectious disease well in advance of the first disclosure of this information to the public on December 31, 2019. Information detailed in this report, including that derived from official Chinese sources, further indicates that a serious biocontainment failure or accident, likely involving a viral pathogen, occurred at the state-run Wuhan Institute of Virology (WIV) of the Chinese Academy of Sciences (CAS) during the second half of 2019 – approximately during the same period of time in which the available epidemiological evidence indicates that SARS-CoV-2 was introduced to the human population in Wuhan. In addition, indirect evidence suggests that the most senior leadership of the CCP likely had at least limited knowledge of this laboratory incident by no later than the middle of November 2019. This incident occurred within a climate of intense political pressure on the CAS to stand up the WIV’s new flagship BSL-4 laboratory complex, the first of its kind in China, and to produce technological breakthroughs in short order that would free China of its so-called “stranglehold” problem.

Awareness of a laboratory incident seemed to have shaped the CCP leadership’s response to SARS-CoV-2: a response characterized by strict controls of information, obfuscation, misdirection, punishment of whistleblowers, and the destruction of key clinical evidence. A closer look at the early days of the pandemic revealed that even when Beijing shared information with the international community – such as the initial notice of a pneumonia outbreak, the later admission that a novel coronavirus was its causal agent, and the publishing of its genomic sequence – it did so belatedly. In all three cases, Beijing possessed the relevant information for some time before sharing it, and disclosed it only when compelled to do so by circumstances beyond its control.

Awareness of a laboratory incident also seemed to inform Beijing’s launch of a quiet, but determined, regulatory campaign in 2020 to strengthen biosafety practices nationwide. This campaign, documented here for the first time, was not incidental to, but rather was often billed as part of the package of emergency measures that PRC authorities were implementing to halt or slow the spread of COVID-19. This muscular and sustained campaign to regulate laboratory safety practices in 2020 and 2021 further stood in

contrast to the showy, but seemingly insubstantial, measures that were taken in early 2020 to regulate wet markets – the most likely site where a zoonotic spillover could have occurred.

Beijing's regulatory campaign was also discordant with its public statements to the international community that portrayed the prospects that the pandemic began as a result of a laboratory-acquired infection as extremely low, dismissing all suggestions to the contrary as farfetched, even conspiratorial. Such dismissal contradicted pre-pandemic statements made by the PRC Ministry of Foreign Affairs and senior officials of the People's Liberation Army (PLA) who warned on multiple occasions that technological advances in synthetic biology were increasing the risk of a devastating lab leak. Before the pandemic, Beijing saw nothing conspiratorial at all about considering the real risks that a laboratory escape of a dangerous pathogen could pose to public health. In fact, it called for measures to prevent such a scenario. Even after the outbreak, major differences were observed between how Beijing communicated internally to officials responsible for biocontainment laboratories and how it messaged externally to the Chinese public and the international community.

Just as Beijing was dismissing the lab leak theory of the origin of COVID-19 in international settings, internally, Beijing was warning its officials that the risk of laboratory-acquired infections with SARS-CoV-2 was significant, and ordering regulatory reforms to be implemented immediately to improve laboratory biosafety conditions. These biosafety regulatory reforms were rolled out in a manner that was concerted, systematic, and top-down, with Hubei provincial and Wuhan municipal authorities, among others, taking steps to carry out Beijing's directives in 2020 and 2021. The WIV also filed three patents between late 2019 and 2021 that looked like remedial measures addressing three different avenues by which an airborne pathogen could infect researchers in a laboratory setting. These innovations that the WIV sought to patent were technical solutions to specific biosafety problems, including those that WIV authors explicitly described as posing a serious risk for the escape of a highly consequential pathogen into the external environment.

A careful reading of reports from the WIV spanning more than a three-year period yielded a picture of a struggling institution: underfunded, underregulated, and understaffed. WIV leadership complained that some portion of their overworked staff

was also poorly trained, while some reports revealed a work culture of laxity toward safety matters and described difficulties adapting to the work environment at their newly constructed facilities. Persistent problems popped up month after month in report after report, casting considerable doubt on the WIV's claims of successful remedy. By their own admission, WIV researchers conducted experiments involving SARS-like coronaviruses, prone as they are to airborne transmission, in BSL-2 laboratory conditions with the relatively negligible protections required of researchers at that biosafety level. The WIV was almost an accident waiting to happen, and it appears that an accident, or perhaps accidents, did happen, and roughly concurrent with the initial outbreak of SARS-CoV-2.

Beginning in late 2018 and building like a crescendo throughout the months of 2019 that preceded the initial outbreak in Wuhan, a series of reports from the WIV indicated that inspections had identified "hidden dangers," "shortcomings," "nonconforming items," and various biosafety "problems" that were described alternatively as "foundational," "critical," and even "urgent." CCP cadres spoke of a rough start for the WIV's new BSL-4 laboratory complex in which they suffered from "no equipment and technology standards, no design and construction teams, and no experience operating or maintaining [a lab of this caliber]." In late July 2019, WIV leaders warned of "urgent problems we are currently facing," and by November, they "pointed to the severe consequences that could result from hidden safety dangers."

WIV researchers labored under the shadow of a political imperative to reduce reliance on imported "key and core equipment" in order to address China's so-called "stranglehold problem." The CCP leadership constantly impressed on WIV management their duty to produce scientific breakthroughs that would fuel "indigenous innovation," and assigned some portion of its staff to projects that were classified as state secrets. With unreasonable expectations that they must propel China to the forefront of the field in short order, compounded by the inherent pressures of working on secret projects for political overlords who also demanded that they reverse engineer essential equipment, or otherwise find technical workarounds just to avoid importing equipment from abroad, one could surely forgive WIV researchers if they faltered or failed. Scientists should not have to toil under such unfavorable conditions, but they did in Wuhan, and no doubt still do.

Counter to what one might expect, the political clock of SARS-CoV-2 began ticking before the epidemiological clock. In other words, Beijing was not just cognizant of the risk of a sudden outbreak of an infectious respiratory disease before it happened, but to some extent, it was preoccupied with guarding against this risk, especially as it pertained to biocontainment laboratories. For whatever reason, the authorities appeared to be preparing for what eventually happened well before, or just before, it happened. For example, at the top leadership's behest, the national legislature started working in earnest on biosecurity legislation in July 2019 that they had previously deemed a relatively low priority. Some of this preoccupation with preventing outbreaks of infectious disease can be attributed to the legacy of the SARS-CoV-1 epidemic of 2003, but as the reader will soon see, other elements are harder to explain with an appeal to history. Once the SARS-CoV-2 outbreak was underway, political prerogatives likewise set the cadence for the medical countermeasures that would follow.

Three years have now passed since the outbreak of a "pneumonia of unknown origin" became public knowledge. In that time, Beijing has displayed an uncharacteristic lack of seriousness toward determining the origin of the disease; the CCP is usually keen to snuff out sources of political and economic instability, and their actions have left no doubt that they regard COVID-19 as a major threat to stability. Beijing has further shown a tendency to resort to highly implausible claims about the origin, asserting it began anywhere other than China (often claiming it came from military laboratories in the United States). To further confuse the situation, Beijing has indulged in fantastical theories, such as the idea that the virus was imported to China through frozen seafood. Meanwhile, it has reacted to the actual outbreak on the ground with excessive seriousness and resolve, as if it confronted not merely a public health emergency, but rather a political crisis with the potential to shake the very pillars of one-party rule.

The inconsistency between Beijing's urgent and aggressive reaction to the outbreak itself and its lackluster efforts to ascertain the virus's origin – alas, its policy has been to actively frustrate international efforts to identify the origin and to punish PRC citizens who try to investigate on their own – suggests that Beijing already knows the origin, and fears that public confirmation of the origin could precipitate an existential crisis for the CCP and therefore must be avoided at all costs. The failure of local authorities to regulate the trade of wildlife at wet markets giving rise to the zoonotic spillover of a

novel human pathogen is a crisis that the CCP has weathered before. There is no reason to believe that they could not survive it again.

Risky research conducted at a state-run laboratory having inadvertently unleashed a novel pathogen, which then set in motion a once-in-a-century pandemic of almost unimaginable devastation, is a decidedly different and unprecedented problem with a path of culpability that leads unquestionably back to Beijing. When one further considers that this state-run laboratory was built to showcase China's growing scientific prowess, and at least some segment of its research involved state secrets, it is not hard to imagine the extreme embarrassment and sensitivity that such a scenario would elicit in CCP leaders, even if the accident had not precipitated a pandemic. Needless to say, we do not yet know with complete certainty that a biocontainment failure was responsible for the first human infection of SARS-CoV-2, but what we present below is a substantial body of circumstantial evidence that supports the plausibility of such a scenario.

SETTING THE SCENE: KEY BACKGROUND INFORMATION

BIOSECURITY AND BIOSAFETY IN THE CHINESE CONTEXT

A key concept discussed in this report is shengwu anquan (生物安全), a Chinese term that can encompass, depending on the context in which it is used, what is commonly meant by the two English terms “biosecurity” and “biosafety.”¹ Shengwu means “biological,” or “bio” in its abbreviated form, while anquan can mean “security” and/or “safety.” For example, shengwu anquan appears as “biosecurity” in the title of the law that PRC authorities have officially translated as the “Biosecurity Law of the People’s Republic of China.”² In the case of the BSL-4 laboratory in Wuhan, however, shengwu anquan is translated as “biosafety,” as the facility is formally known as the Wuhan National Biosafety Laboratory of the CAS.³ For an authoritative definition of shengwu anquan as it is understood in China, we refer the reader to multiple reports issued by the official Xinhua state news agency, which cited the following definition attributed to Wu Guizhen, the chief expert on the subject at the Chinese Center for Disease Control and Prevention (CCDCP): “Shengwu anquan is classified as non-traditional security. It includes emerging and sudden outbreaks of infectious disease, erroneous use and deliberate misuse of new biotechnology, biosafety in laboratories, and the loss of national important hereditary materials and genetic data, etc.”⁴

BIOTECHNOLOGY: A “FOCAL POINT” OF CHINA’S ECONOMIC STRATEGY

The biotechnology industry occupies a prominent place in the CCP’s strategic vision for China’s economy in the 21st century, and the success of that strategic vision will rest in part on the success of the WIV. As early as 1986, biotechnology was designated as one of seven major research areas under China’s national high-technology research and development (R&D) plan called the “863 Program,” which is regarded as its second most important civilian-military R&D program after the “Two Bombs and One Satellite” science and technology development plan of 1956-67 that led to the development of a nuclear bomb and intercontinental ballistic missile.⁵ In 1988, the PRC State Council laid out long-term plans aimed at developing biotechnology, which involved the construction of state-of-the-art laboratories and attracting foreign researchers and Chinese scientists

trained abroad to conduct experiments in China.⁶ By 2004, the State Council had set up a National Leading Group on Research, Development, and Industrialization of Biotechnology, with representatives drawn from the Ministries of Science and Technology, Education, Finance, Agriculture, and Health.⁷

In 2015, the State Council issued a national economic planning strategy aimed at high-tech industrialization and curbing dependence on foreign-made technology called “Made in China 2025.” The plan gave considerable prominence to the defense industry, particularly space and aviation,⁸ and categorized biopharmaceuticals as a “strategic focal point,” calling for attracting foreign investment and making ample use of international cooperation to stimulate high-end manufacturing of biopharmaceuticals and other advanced technologies in China.⁹ China’s 14th Five-Year Plan, covering the years 2021 to 2025, likewise seeks to establish China as the global leader in biotechnology, particularly synthetic biology, as well as six other science and technology fields to which Beijing is committing significant resources.¹⁰

The CCP is interested in synthetic biology for many reasons. Its high-tech surveillance system increasingly relies on the mass collection of genomic data to target specific individuals and ethnic groups it seeks to control, such as Tibetans and Uyghurs, whose homelands were annexed by the CCP.¹¹ Beijing further hopes that synthetic biology will meet the needs of a rapidly aging population and solve food supply challenges that it believes could result from climate change.¹² The PLA also considers synthetic biology to be a promising domain for military application.¹³ Before synthetic biology developed as a distinct field in China, the PLA already showed a general interest in biotechnology, particularly pharmaceuticals, both in pursuit of profit as well as military applications. In the 1990s, the PLA General Logistics Department invested heavily in the Sanjiu Pharmaceuticals Group, and by the end of that decade, the PLA was believed to be in charge of as many 400 pharmaceutical companies in China.¹⁴

The CCP’s determination to catapult China into the global lead in biotechnology development is evident in the substantial investment that the party-state is directing into the sector. Some observers have estimated that PRC authorities have collectively invested over US\$100 billion in life sciences R&D.¹⁵ The Ministry of Science and Technology (MOST) has set ambitious goals for the biotechnology sector, including a growth target for the sector as a whole to account for four percent of China’s total GDP

by 2020.¹⁶ As one biodefense expert put it in her testimony to the U.S. Senate Armed Services Subcommittee on Emerging Threats and Capabilities, “China has said repeatedly and forcefully, and they’re backing up their words with actions, that they intend to own the bio-revolution. And they are building the infrastructure, the talent pipeline, the regulatory system, and the financial system they need to do that.”¹⁷

WUHAN ASPIRES TO BECOME NATIONAL CENTER FOR BIOTECH RESEARCH AND BIOPHARM INDUSTRY

Wuhan, the capital of Hubei Province and the largest city in central China, is positioning itself to become a major base, not only for basic research in the life sciences, including synthetic biology, but specifically for biopharmaceutical production. In April 2019, the General Office of the Wuhan Municipal People’s Government issued a detailed 25-page development plan aimed at building a comprehensive health industry by 2035. That long-term plan described the BSL-4 laboratory at the WIV as a key driver for the development of the city’s broader health industry: “Bring into full play the driving effect of core institutions [such as] the Wuhan Institute of Biological Products, the Chinese Academy of Sciences P4 Biosafety Laboratory, and the Sinopharm Wuhan Plasma-Derived Biotherapies Company Limited.”¹⁸

In November 2019, the Hubei Provincial Development and Reform Commission issued its 2020 work plan that called for “actively putting forward proposals to build Wuhan into a comprehensive national production innovation center” and “actively planning to establish a cluster of national major science and technology infrastructure.”¹⁹ The provincial work plan cited the Wuhan National Biosafety Laboratory (BSL-4) complex at the WIV as a part of that cluster of science and technology infrastructure that would “raise indigenous innovation capabilities in critical fields.”²⁰ As early as 2014, Xi Jinping highlighted the importance of the WIV’s new lab, noting that “the construction of the P4 laboratory is of vital importance to Chinese public health.”²¹

THE LIFE SCIENCES IN THE PLA: THE ACADEMY OF MILITARY MEDICAL SCIENCES

The PLA, the armed wing of the CCP, has played an outsized role in the development of the life sciences since the founding of the PRC in 1949. Biological research conducted by the PLA takes place primarily under the auspices of the Academy of Military Medical

Sciences (AMMS), which was founded in 1951,²² and is currently led by Major General Zhang Shitao.²³ The AMMS has 11 subordinate research institutes, the most important of which for the purposes of this investigation is the Institute of Microbiology and Epidemiology in Beijing, which studies the pathogenesis of microorganisms, conducts epidemiological studies, and carries out basic and applied research in virology, parasitology, and bacteriology. The AMMS also engages in the development of pharmaceuticals and medical countermeasures, including vaccines, antibodies, antimicrobial and antiviral drugs, and diagnostic testing.²⁴

In 1993, the PRC declared to the Biological and Toxin Weapons Convention (BWC) that the AMMS Institute of Microbiology and Epidemiology was a “national defensive biological warfare R&D program.”²⁵ In December 2021, the U.S. Department of Commerce added the AMMS to its export blacklist over concerns about its misuse of emerging biotechnologies, including gene editing, human performance enhancement, brain machine interfaces, and biological materials, to support military applications.²⁶ As this report will later demonstrate, the AMMS Institute of Microbiology and Epidemiology is an important research partner of the WIV.

In 2017, the AMMS was placed under the authority of the PLA Academy of Military Science (AMS), which reports directly to the Central Military Commission chaired by Xi Jinping.²⁷ This organizational restructuring was part of PLA reforms first launched by Xi in late 2015²⁸ aimed at 1) spurring technological innovation by blending AMS work on strategy and doctrine with the applied research conducted by a wide range of PLA science and technology institutes like the AMMS,²⁹ and 2) better leveraging science and technology as key enablers of combat capabilities.³⁰ In addition to the AMMS, the reform also brought under the AMS umbrella the PLA Institute for Chemical Defense (ICD),³¹ the original establishment of which was authorized by Mao Zedong in 1950 to serve as “the cradle of the Chemical Defense Corps.”³² The Chemical Defense Corps has historically engaged in offensive chemical warfare operations³³ as well as exercises that simulate defensive tactics against chemical warfare.³⁴ In 2019, the PLA Daily described the ICD as China’s “only professional college to train nuclear, biological, and chemical defense personnel,” and the “nuclear, biological, and chemical emergency response support center” for the PRC government and the PLA.³⁵

The AMMS has historically spearheaded the construction of biocontainment labs in China. The AMMS built the PRC's first laboratory that met modern BSL-3 standards.³⁶ While multiple Chinese language reports date the creation of the first BSL-3 lab to 1987, an English language source written by a WIV expert placed it in "the early 1980s."³⁷ Chinese sources are also inconsistent on the matter of what exactly the lab was built to study. Some claim that the first BSL-3 lab was designed to study the transmission mechanism of epidemic hemorrhagic fever viruses,³⁸ while others maintain that HIV was the primary subject of its research.³⁹

We could not find any open-source document that disclosed where the PLA built this first BSL-3 lab. The time of construction, however, preceded two outbreaks of hemorrhagic fever in the late 1980s in an area of the Xinjiang Uyghur Autonomous Region (XUAR) where such diseases had never been observed before. Soviet intelligence believed that these localized outbreaks were caused by a laboratory accident that occurred during the process of weaponizing viral pathogens.⁴⁰ In 1999, a Taiwanese expert also claimed that the PLA had built a biological weapons facility in the Tarim Basin near the Lop Nur nuclear testing site in the XUAR.⁴¹ In the late 1980s, Soviet intelligence reportedly possessed satellite imagery of a biocontainment lab and a large fermenting plant close to Lop Nur.⁴² It is not clear if this facility in the XUAR was the BSL-3 lab of the AMMS, or some other undisclosed PLA installation.

The U.S. Department of Defense has long assessed that the PLA maintained an offensive biological warfare program from the 1950s until at least the late 1980s, and during this time, had probably weaponized ricin, botulinum toxins, and the causative agents of anthrax, cholera, plague, and tularemia.⁴³ A considerable amount of research has also been conducted in China on other potential biological warfare agents, including Q fever, western and eastern equine encephalitis, and psittacosis, among others.⁴⁴ In 1993, U.S. intelligence officials told the Washington Post that Beijing may have been expanding its offensive biological weapons program – a conclusion based in part on the finding that the PLA was pursuing research on biological agents at two ostensibly civilian-run research centers that were, in fact, controlled by the PLA.⁴⁵ In 2007, the Defense Intelligence Agency testified to the U.S. Senate that it believed Beijing "continues to maintain some elements of an offensive biological weapons program."⁴⁶

To this day, the PRC has not provided sufficient information to the international community that would allow a determination to be made whether the PRC eliminated its historical biological warfare program, and Beijing has never acknowledged publicly or privately the existence of its historical biological warfare program.⁴⁷ The PRC continues to engage in a wide range of biological activities with dual-use applications,⁴⁸ both at formal PLA institutions such as the AMMS as well as at ostensibly civilian research institutions like the WIV.⁴⁹ As recently as 2021, the United States expressed BWC compliance concerns with respect to toxin R&D being conducted at military medical institutions in China because of their dual-use applications and their potential as a biological threat.⁵⁰

THE PLA'S INTEREST IN THE **WEAPONIZATION** OF BIOTECHNOLOGY

The significance of the rapid development of biotechnology from the 1990s until the present has not been lost on PLA strategists. Many of them have analyzed the potential military applications of biotechnology and argued that biotechnology is transforming the nature of warfare in the 21st century. In 2005, PLA Colonel Guo Jiwei, a professor at the Third Military Medical University, highlighted the human genome project, bioinformatics, proteomics, and transgenic technology as possessing “great value in military affairs.”⁵¹ Guo further explained: “We can use many modern biotechnologies directly as a means of defense and attack, and with further development, they probably will become new weapons systems.”⁵² In 2010, Colonel Guo published a book called *War for Biological Dominance* that further developed his case that various applications of biotechnology would profoundly shape warfare of the future.⁵³

The PRC Ministry of Foreign Affairs submission to the BWC in 2011 provided another important window into “current Chinese thinking on the development of new science and technology,” as it detailed dual-use concerns pertaining to emerging lines of research such as the creation of “man-made pathogens,” “population-specific genetic markers,” and “targeted drug-delivery technology [that make] it easier to spread pathogens.”⁵⁴ For the purposes of this study, we would like to highlight that the PRC submission showed an acute awareness of the potential danger posed by the techniques of synthetic biology that allow researchers to engineer chimeric viruses. The PRC specifically warned that a laboratory accident involving such an artificial pathogen could cause tremendous harm: “Accidental mistakes in biotech laboratories can place mankind in great danger. Synthetic biology in some civilian biotechnology research and applications may

unintentionally give rise to new, highly hazardous man-made pathogens with unforeseeable consequences.”⁵⁵ It further noted that “research into genetic differences and susceptibility to pathogens among different populations and species can lead to the creation of racial bioweapons based on genetic differences between races.”⁵⁶

The PRC submission to the BWC specified four ways in which the rapid development of biotechnology may “significantly increase the destructiveness of biological weapons”:

1. Microbial genomic research can enhance the virulence or pathogenicity of a pathogen by modifying its antigenic properties....
2. Supergenes conferring resistance to antibiotics can be synthesized by DNA recombination technology, making pathogens highly drug-resistant. Pathogens with detoxifying genes can also be produced, as can pathogens that can evade recognition and attack by the immune system, rendering vaccines and medicines useless....
3. RNA interference can inactivate specific genes in the body, inhibit expression of important bodily proteins, disrupt physiological function and heighten the effects of a bioweapon attack....
4. Foreign genes or viruses can be introduced into the target population asymptotically by means of gene therapy vectors, enabling a biological weapon attack to be mounted covertly....⁵⁷

A 2014 interview with General Liu Yazhou, the political commissar of the PLA National Defense University (NDU), provided further insight into the PLA’s fixation with biotechnology: “Biologized warfare is ready to take the stage.... After the mechanization [of war] was the informatization [of war], after informatization, then it will be the biologization [of war].... Science and technology is first and foremost applied most broadly in military affairs. Now, what is it that is most flourishing, and developing the most swiftly and violently? It is the life sciences!”⁵⁸

General Liu went on to explain: “Scientists for a long time have been tirelessly exploring and seeking breakthroughs, leading biotechnologies such as gene chips [DNA microarray] and protein chips [protein microarray] to reach maturity day by day. Bioengineering, such as enzyme engineering and cell engineering, is also emerging in an endless stream. The organic ‘grafting’ of biotechnology to bioengineering, while benefiting the lives of mankind, also simultaneously induces labor for the birth of one batch of biological

weapons after another.”⁵⁹ Liu concluded that “predictably, biologized warfare is on the verge of reaching a critical juncture.”⁶⁰ It is worth noting that Liu’s influence extends beyond the PLA to the broader CCP, as Liu’s marriage to the daughter of Li Xiannian, one of the Eight Elders of the CCP, places him in the exclusive circles of the CCP’s princelings.⁶¹

In 2015, Major General He Fuchu, then-president of the AMMS, predicted that biotechnology would become the new “strategic commanding heights” of national defense.⁶² He, whose research focuses on genomics and bioinformatics, was subsequently promoted to vice president of the newly expanded AMS and appointed to serve on the Central Military Commission’s Science and Technology Committee – personnel decisions that appear to reflect the strategic priority that the CCP has placed on developing biotechnology.⁶³ In 2012, an official PLA-run publisher issued a book by Senior Colonel Du Chao, a professor at the PLA Nanjing Army Command Academy, titled *China’s Future War*.⁶⁴ Du’s book made the case that the world’s great powers, including the United States, had not stopped R&D of biotechnology and bio-warfare agents, and warned that biological weapons, including viruses, toxins, and genetic weapons, were powerful tools of war that could achieve a great effect, even if deployed in small quantities.⁶⁵

In 2017, General Zhang Shibo, summing up his views on technology and warfare in his final book before his retirement as president of the PLA NDU, assessed that biology was one of seven “new domains of warfare,” and argued that “modern biotechnology development is gradually showing strong signs characteristic of an offensive capability.” He further raised the possibility that “specific ethnic genetic attacks” could be developed using gene editing technologies.⁶⁶ General Zhang is an influential figure. Before becoming president of the PLA NDU, Zhang commanded combat units at every level of the PLA Army. He was commander of the PLA garrison in Hong Kong and the Beijing Military Region, two of the most critical jobs in the PLA. He also sat on the CCP Central Committee for a full decade, initially as an alternate and later as a full member.⁶⁷

Zhang’s and Du’s views are not simply their own. They represent two distinct levels of the PLA: the former being the highest level of military education for senior leaders and generals, and the latter being mid-level operational and professional training for officers. Importantly, the educational goals that they articulated with regard to biotechnology

were the same. Future and current PLA leaders are being taught that the United States (and Russia, India, and Taiwan) are engaged in secret programs to produce various biological weapons, and that the use of these weapons against China is almost inevitable. Both Zhang and Du remind their readers that China suffered heinous biological attacks from Japan during World War II, and argue that the United States is the country that poses the greatest threat to China because it used chemical weapons in Vietnam and is the only country to have used nuclear weapons in history.⁶⁸

As further evidence of the representativeness of Zhang's and Du's views, we note that the same year that Zhang's book was released (2017), a new edition of the foundational text on PLA strategy, *The Science of Military Strategy*, was also published. For the first time, the textbook included an entire section about biology as a domain of military struggle and pondered the prospects for new forms of biological warfare, such as "specific ethnic genetic attacks."⁶⁹

The view that "genetic weapons" are the future of warfare and that the United States is plotting to use them against China is commonly held among PLA strategists. Shi Haiming, professor at the PLA National University of Defense Technology, alleged in a November 2017 interview that Washington was collecting genomic samples of Russians for use in developing genetic weapons.⁷⁰ A 2014 PLA Daily piece likewise claimed American forces had prepared biological weapons for use against Chinese and Southeast Asians in the 1960s,⁷¹ while a 2016 piece claimed the Pentagon was currently building a genomic database targeting Chinese and Arabs.⁷² Another 2016 piece blended historical and contemporary allegations, claiming Washington employed Imperial Japan's Unit 731 to research and produce biological agents on a large scale after U.S. forces occupied Japan at the end of World War II, and is developing genetic weapons in the present era.⁷³

PLA analysts make such allegations about the United States in order to frame their calls for the PLA to take action in response; in Shi Haiming's case, he advised that "special research should be conducted on the military strategies, ways, and means that may be implemented in the future biological information war, and operational contingency plans should be formulated as soon as possible."⁷⁴ Shi made the following observation about what weaponizing such technology would involve: "In a word, it is simply using DNA recombination technology to alter a bacterium or virus to make those that are non-pathogenic [to humans] pathogenic, and to make those diseases that vaccines or

medicines can be used to prevent and treat into ones that are difficult to prevent and treat. Putting this kind of biological warfare agent inside of a device that can discharge it constitutes a genetic weapon.”⁷⁵

Four days after the PLA Daily published Shi’s interview in 2017, it ran a piece by PLA AMMS researcher Cao Shiyang that reiterated the themes developed by Zhang, Du, and Shi, and amplified the allegation that the U.S. military was collecting biological samples to design bioweapons targeted at foreign adversaries.⁷⁶ “Genetic weapons refer to the modification of the genetic code of pathogenic microorganisms through gene editing technology and the development of a new generation of biological weapons that can attack the enemy at the genetic level,” Cao explained, “In simple terms, gene editing technology is equivalent to genetic ‘scissors,’ which can splice genetic fragments of one organism into another organism in accordance with the subjective wishes [of the technician], thereby changing its physiological characteristics. It is precisely in this manner that genetic weapons modify genes to obtain new pathogenic microorganisms, thereby invalidating the other party’s vaccine bank.”⁷⁷ Cao offered further insight into the challenge of developing medical countermeasures for man-made chimeric viruses: “Owing to the fact that genetic weapons are new viruses and new bacteria that have been ‘cut out,’ only the designer knows the genetic code, and it is difficult for the other party to promptly decipher and develop a new vaccine to fight it. Even if they update their vaccine bank, an unending stream of new genetic weapons is ‘ready and waiting to march.’”⁷⁸

Potentially interesting for the purposes of this study, Cao Shiyang warned that bioengineered viruses could be accidentally released: “If there is improper operation, bad luck, or a leak occurs during the transportation process, you hurt your own people. It is tantamount to ‘lifting a stone only to drop it on your own feet.’”⁷⁹ A February 2019 piece on “The Militarization of Biotechnology” written by a researcher in the state-owned defense industry also recognized that genomic editing of viruses and synthetic biology could harm public health by “bringing about a series of significant security threats such as the proliferation of biological weapons, terrorist attacks, cross-species infections of pathogens, and the transmission of viruses across regions.”⁸⁰ By December 2019, a PLA AMMS researcher and CAS researcher were implying that Cao’s proverbial stone had been dropped, as they published a piece in a CCP official newspaper warning about the

“double-edged sword” of biotechnology, including “dangers from domestic supervision and regulatory holes.”⁸¹

In keeping with the PLA’s assessment of the potential of CRISPR-Cas9 and other gene editing technologies to be used to create weapons targeting the genetic vulnerabilities of specific types of people, PLA strategists have consistently called on Beijing to restrict foreign access to Chinese genetic data and material, and to conduct more domestic research focused on mapping out the genome of the Chinese people to determine any unique genetic vulnerabilities that could be exploited by an adversary developing a biological agent, and conversely, to advance their own understanding of biological agents that would harm other races, but not Chinese people.

In a November 2018, two experts at the PLA National University of Defense Technology wrote a piece arguing that the Chinese public was worried about their genomic data leaking to foreign countries, and explained the worry thusly: “The reason is very simple. With a sufficiently large quantity of human genetic samples, it is possible for some countries to develop specialized ‘genetic weapons,’ particularly ‘racial genetic weapons,’ perhaps casting a new shadow to hang over all of our heads, leaving us no choice but to defend against it.”⁸² The perceived risk that genetic weapons could be developed to target the Chinese race was not a passing reference, but rather the central theme of the piece: “Research indicates that human DNA is 99.7 percent to 99.9 percent identical, and it is this small minority of differences that is the key to differentiating between the races. Therefore, every ethnic group and race has unique genetic traits, and theoretically speaking, it is possible to develop genetic weapons predetermined to kill and injure targets of a particular race....”⁸³

In 2019, the authorities acted on the PLA’s advice. On March 20, the State Council passed a revised version of the “Human Genetic Resources Management Regulations.”⁸⁴ The updated regulations significantly strengthened the state review process for any research done with international institutions or individuals abroad that involves the use of genetic material. It also sought to clarify and further standardize procedures for the use of genetic material in domestic R&D as a matter of “public health, state security, and the public interest.”⁸⁵ The CCP’s embrace of the PLA’s view on the inevitability of what might be called the racialization of biological warfare was also evident in the PRC’s official submission to the BWC in 2011. It contained an entire subsection titled

“Systems biology further revealing population-specific genetic markers.”⁸⁶ The PRC submission pointed out how “genome-wide association studies have found variations in the genes for susceptibility to infectious diseases among different populations; epigenetic studies further indicate the existence of population-specific genetic markers of susceptibility to disease.” The conclusion drawn tracks with the PLA’s view: “It can also create the potential for biological weapons based on genetic differences between races.”⁸⁷

THE PLA’S INTEREST IN CORONAVIRUSES

Now that we have established the PLA’s general interest in biotechnology and its considered view that biotechnology is transforming the nature of modern warfare, we should explore the question of whether the PLA had any specific interest in coronaviruses, and if so, how that interest may or may not have related to research conducted at the WIV. In August 2015, the official publishing house of the PLA AMMS published a book titled *The Unnatural Origin of SARS and New Species of Artificial Viruses as Genetic Weapons*.⁸⁸ The book’s primary thesis is that SARS-CoV-1 did not emerge naturally through a process of zoonotic spillover, but rather was a genetic weapon, that is, a chimeric virus artificially engineered to infect humans.⁸⁹

The authors pointed to various epidemiological and molecular oddities of the virus as supposed evidence of its unnatural origin, such as the unprecedented speed of its attrition and disappearance from human circulation, the failure to isolate a complete strain of the virus in a natural reservoir or intermediary, a mutation rate that was inconsistent with natural evolution, and a pattern of “reverse evolution” observed in accessory genes that are supposedly unique to the virus.⁹⁰ The authors interpreted an estimate published by WIV researchers that the interspecies transfer of the SARS-CoV-1 lineage from bats to the amplifying host (e.g., civets) happened roughly 4.08 years before the SARS outbreak⁹¹ as supportive of their thesis: “SARS-CoV could not have taken place in the natural world during this period of just over four years of evolutionary time. It could have only appeared in an artificial setting, by [the application of] man-made technology....”⁹²

The book described experimental techniques that a virologist could use to create chimeric viruses like SARS-CoV-1:

1. Apply the latest genetic modification technology to induce recombination between an animal virus and a human virus, and then passage it through tissue cells that are most similar to human cells to strengthen the pathogenicity of the virus to animals with close affinity to humans until the point that the virus can directly attack humans.
2. Take an animal pathogen (at present this is mostly viruses) and use various methods and channels to attack animals with [naturally] high affinity with humans or animals with cellular receptors that are very similar to humans, and conduct various kinds of passaging many times until the pathogen ultimately adapts to transmit among the intended group of animals, and then go through the same procedures until it induces partial adaptation to humans. The authors are provisionally calling this “adaptive trials among animal groups for an artificial human pathogen.”
3. Combine the two methods described above.⁹³

The authors highlighted a famous gain-of-function study with avian influenza conducted by the University of Wisconsin-Madison and the University of Tokyo in 2012 as an important case study of how passaging a virus through ferrets could confer the properties needed for highly efficient transmission in humans via respiratory droplets.⁹⁴ The aerosolization of biological agents is discussed multiple times in the book as an important element of engineering chimeric viruses as genetic weapons,⁹⁵ and a section that outlines the ideal properties of a biological agent identifies one such desirable trait as the ability to transmit through aerosols between 1-5 mm in size.⁹⁶ For the reader’s reference, SARS-CoV-2 is transmitted via respiratory droplets and aerosols, and its genes have been detected in sampled aerosol particles measuring between 1-4 mm or even less in size.⁹⁷

For the purposes of this study, it is important to note that the techniques described above have been routinely used by researchers at the WIV and elsewhere to artificially construct novel pathogens.⁹⁸ These techniques would not vary substantially whether the purpose of the researcher were benign, such as pathogen discovery, or malign, such as developing a bioweapon. As the authors of this book readily acknowledged, this type of research is inherently dual-use, making it difficult to distinguish between biological research for defensive and offensive purposes.⁹⁹

The authors do not state that the PLA is developing chimeric viruses as genetic weapons, but they do describe an international threat environment in which they are convinced that others are doing exactly that. The authors believe that the number of countries that possess biological weapons is increasing,¹⁰⁰ that biological weapons have been used in localized conflicts,¹⁰¹ that “various types of terrorists” are seeking to develop viruses as genetic weapons,¹⁰² and that state actors that the PLA regards as its adversaries, including the United States, have maintained lines of research related to bioweapons to the present day.¹⁰³ They also acknowledged that the PLA was researching the differences between SARS-CoV-1 and MERS that they believed demonstrated that SARS-CoV-1 was a genetic weapon as opposed to the naturally occurring MERS.¹⁰⁴ While arguing that SARS-CoV-1 was the only virus that they could prove was developed as a genetic weapon, the authors said they “could not preclude the possibility” that H7N9, the Asian Lineage Avian Influenza A Virus, was also a genetic weapon of the ecological variety.¹⁰⁵

The authors of the book further argued that the new generation of genetic weapons differ substantially from traditional biological weapons because the former are based on new artificially engineered pathogens that are not found in nature while the latter simply weaponized naturally existing pathogens in their original, or a slightly modified, form.¹⁰⁶ The authors see the potential scope for the use of chimeric viruses as much broader than the wartime uses to which traditional biological weapons have been confined: “The purpose of using modern genetic weapons is not primarily for military motives but rather as an important terror threat, [and to meet] political and regional or international strategic requirements.”¹⁰⁷ Another passage describes biological weapons as relevant not only in the context of international military conflict but also to the more general context of “political struggle.”¹⁰⁸

Deniability is cited as a major advantage of genetic weapons: “If one uses a modern genetic weapon, it will be stealthy and difficult to collect evidence; no matter if academic evidence is provided, or even empirical proof of the virus or the animal, there are still a hundred and one ways to deny this too, to block and suppress, and to leave international organizations and advocates for justice utterly helpless.”¹⁰⁹ The authors note that the aggressor’s efforts to evade responsibility will be aided by skepticism among the victims of the attack:

Modern genetic weapons are much more intelligent [than traditional bioweapons] and leave the targeted area completely unsuspecting [of what happened], unsuccessful in their prevention efforts, and [they] even throw their thinking into a state of chaos in which they cannot understand the true situation. Even more horrible to contemplate, and which leaves people distressed, is the likelihood that some individuals will blindly believe that the conditions and motives do not currently exist to produce and release a “modern genetic weapon.” The result will be that these people will unintentionally obstruct to one extent or another the search for the origin of the release of the genetic weapon.¹¹⁰

The authors assert that a skilled virologist could use genetic engineering to create a new strain of influenza with artificial modifications analogous to natural mutations, thus rendering it difficult to discern its artificial origin.¹¹¹ Their view that the stealth nature of genetic weapons is an appealing aspect of these weapons is found in many other PLA writings. For example, Shi Haiming, professor at the PLA National University of Defense Technology, said in a 2017 interview that “genetic weapons are difficult to detect, difficult to predict and prevent, [and] difficult to isolate, and the production costs are exceedingly low....”¹¹²

Some degree of authoritativeness can be ascribed to this book on the basis of its acceptance by an official PLA publishing house, and its production and editing through a collaborative process involving 18 experts, 16 of whom are officers working at the AMMS or other PLA research centers. One of the book’s two editors-in-chief, Xu Dezhong, reportedly advised the Central Military Commission and health authorities during the SARS-CoV-1 epidemic, briefing them 24 times and preparing three reports on the outbreak.¹¹³ The second editor-in-chief, Li Feng, served as the deputy director of the Bureau of Epidemic Prevention in the PLA General Logistics Department.¹¹⁴ Yang Ruifu of the PLA AMMS Institute of Microbiology and Epidemiology, a deputy editor of the book, has lectured at the WIV and partnered with its researchers. In December 2016, the WIV reported about a special presentation delivered by Dr. Yang on “investigating the origin of pathogens and rapid testing.”¹¹⁵ It was held in a large lecture hall and well-attended by WIV researchers and graduate students.¹¹⁶ Yang has a long record of research collaboration with the WIV,¹¹⁷ having reportedly coauthored at least a dozen scientific papers with WIV researchers,¹¹⁸ and served as a reviewer for Shi Zhengli’s journal *Virological Sinica* between November 2019 and October 2020.¹¹⁹ Far from being

a fringe figure, Yang received a meritorious service award directly from Xi Jinping in his role as Central Military Commission chairman less than six months before this book was published.¹²⁰

THE CAS AND THE PLA: A LONGSTANDING PARTNERSHIP

The CAS is the PRC's premier organization for science and technology R&D, and while it may bear a superficial resemblance to academic institutions in the West, the CAS is distinct in important ways.¹²¹ As one German Sinologist cautioned in a seminal work on the CAS: "The portrayal of the Chinese Academy of Sciences is a difficult task because traditions and the conditions for scientific research in China differ from those in the Western world in almost every respect."¹²²

First of all, the CAS is massive, boasting some 61,000 personnel spread across 104 research institutes, 12 branch academies, and two universities,¹²³ and thus dwarfs similar academic institutions in the West. More than 85 percent of China's large-scale science facilities belong to the CAS.¹²⁴ It operates on a budget of approximately RMB 42 billion (US\$6.7 billion) with a majority of its funds coming from the PRC government.¹²⁵ This study examined CAS closely because the WIV is a CAS research institute. The full, formal name of the WIV is the "Chinese Academy of Sciences Wuhan Institute of Virology."¹²⁶ The WIV answers directly to the Wuhan branch office of the CAS and the CAS headquarters in Beijing, not to the Wuhan municipal authorities. The CAS answers directly to the State Council.

Second, the CAS is not only state-funded, but it is also state-run. The CAS is essentially the R&D arm of the PRC government in the natural and applied sciences.¹²⁷ Although many research institutions outside of China likewise rely heavily on state support, they generally enjoy considerable autonomy to pursue research as they see fit. In China, by contrast, CAS and other state-run research institutions exist, first and foremost, to serve the party-state and its top-down approach to research and innovation.¹²⁸ The CCP does not regard them as independent entities.¹²⁹ The CAS founding charter describes its mission thusly: "Under the leadership of the Central Committee of the Chinese Communist Party and the State Council..., [the CAS] takes part in the development of science and technology and contributes to the building up of a modern, socialist, and strong state."¹³⁰ The CAS is one of 18 government and party entities whose personnel

matters are overseen by the Talent Work Coordination Small Group of the CCP Central Committee's Organization Department.¹³¹

Third, the CAS is not a purely civilian institution. CAS researchers work for and with the PLA in various ways. The CAS is civilian insofar as it is subordinate to the State Council, the highest executive organ of state power and roughly the equivalent of the cabinet, rather than to the Central Military Commission.¹³² The civilian command structure of CAS does not, however, preclude the PLA from having a role at the CAS, nor does it exempt the CAS from the political imperative to advance the PLA's research agenda. To the contrary, much of the work done at the CAS contributes to products for military use.¹³³

The CAS has had "an extensive history of involvement in the development of the country's most advanced civilian and military technologies since its inception," according to one expert on China's defense industry.¹³⁴ Classified studies are conducted at the CAS on a routine basis.¹³⁵ The CAS research agenda is largely dictated to it by the party-state, and the pursuit of explicitly dual-use goals and applications is common.¹³⁶ CAS researchers regularly collaborate with PLA counterparts,¹³⁷ hosting them as visiting researchers at CAS facilities,¹³⁸ participating in joint trainings,¹³⁹ and engaging in professional exchanges.¹⁴⁰

The PLA has hired CAS experts to work as technical advisers for various military platforms, including missiles, radar, communications, and information technology.¹⁴¹ In 2009, a formal program for experts at the CAS and the Chinese Academy of Engineering (CAE), the sister organization of CAS, to mentor select military personnel was established, ensuring that significant numbers of CAS researchers are involved in the PLA's most important science and technology projects. By 2015, 401 CAS and CAE academicians, 78 of whom were assigned to the PLA Air Force alone, and many more CAS researchers who lack the academician title, had been recruited into the PLA mentorship program.¹⁴² The U.S. government has known for many decades that the CAS played an integral role in developing China's nuclear weapons,¹⁴³ and the historic military contributions of the CAS are a point of pride openly discussed by PRC officials to this day.¹⁴⁴ This knowledge, however, seems to have faded from public memory in the West, as ties with the PRC gradually grew closer after the establishment of

diplomatic relations, and the temptation to avoid difficult questions about PRC interlocutors became stronger.

The history of integrating civilian CAS scientists into military research projects and weapons development programs stretches back to the beginning of the PRC. Nie Rongzhen, a celebrated PLA marshal who fought in the communist revolution and supervised the development of a nuclear bomb,¹⁴⁵ was perhaps the first PLA leader to mobilize civilian researchers for military purposes, as Nie organized problem-solving “strike teams” composed of the best civilian talent to tackle the research challenges of the nuclear and missile programs.¹⁴⁶ Two-thirds of CAS researchers were assigned to work on the PLA’s satellite, missile, and nuclear weapons programs during the 1950s and 1960s.¹⁴⁷ CAS researchers led by nuclear physicist Zhou Guangzhao ran the final check of calculations before the PLA conducted its first test of an atomic bomb.¹⁴⁸ The scientists widely credited for the success of the PLA’s satellite, missile, and nuclear weapons programs, such as Deng Jiaxian, Qian Sanqiang, and Qian Xuesen, were all associated with the CAS, and benefited from long stints of study abroad and/or collaboration with foreign scientists.¹⁴⁹ PRC founder Mao Zedong reportedly said to Qian Xuesen: “I’ve heard that the Americans view you as a five-star general! The way I see it, [and] as far as we are concerned, you are much more powerful than a five-star general.”¹⁵⁰

Four CAS scientists, Wang Daheng, Wang Ganchang, Chen Fangyun, and Yang Jiachi, birthed the idea for the 863 Program, the PRC’s long-term military science and technology plan, which prioritized dual-use R&D in seven high-tech fields, including biotechnology, and sought to embed military programs within China’s civilian science and technology base.¹⁵¹ They convinced CCP paramount leader Deng Xiaoping to launch the program in 1986 and give it ample funding. These four CAS researchers “ranked among the small core of Chinese strategic weapons pioneers of the glory years under Mao.”¹⁵² They “explicitly evoked China’s past achievements in strategic weapons” to justify the need for the program, which is ongoing today.¹⁵³

The “father of China’s nuclear submarines,” Huang Xuhua, was likewise a CAS academician, and he was described as a model for WIV researchers to emulate during a training held at the WIV in October 2018.¹⁵⁴ Drawing a parallel between the WIV’s work and China’s nuclear submarine program makes sense in the historical context of the CAS

supporting the development of military technologies, particularly in light of Wuhan's specific role in designing China's nuclear submarines. The Wuhan Second Ship Design and Research Institute, also known as the 719 Research Institute,¹⁵⁵ contributed directly to the design of China's first nuclear submarine.¹⁵⁶ CAE academicians are counted among the personnel at the 719 Research Institute.¹⁵⁷

CAS personnel can likewise be found embedded within PLA institutions. Of the 749 senior CAS researchers who bore the distinguished title of "academician" in 2015, 54 of them worked for the PLA or the defense industry.¹⁵⁸ CAS academicians can be found at the Dalian Naval Academy, the Air Force Medical University in Xi'an, the Strategic Support Force Space Engineering University in Beijing, and the Strategic Support Force Information Engineering University in Zhengzhou.¹⁵⁹ CAS academicians also reportedly reside at the China Aerodynamics R&D Center, also known as the 29th Testing and Training Base (63820 Unit) in Sichuan Province, and the Northwest Institute of Nuclear Technology in Xi'an.¹⁶⁰ The Central Military Commission tapped Lieutenant General Liu Guozhi, a CAS physicist and director of the China Nuclear Test Base, to head its new Science and Technology Committee formed in late 2015 to carry out Xi's reforms.¹⁶¹ The chief engineer of the Xi'an Satellite Control Center Technology Department, Li Jisheng, is a CAS academician.¹⁶²

In summer 2015, the State Administration for Science, Technology, and Industry for National Defense created a Development Strategy Committee to advise the CCP leadership on its long-term defense R&D expenditures for military science and technology. Ten academicians from the CAS and its sister organization, the CAE, were selected to serve on the committee.¹⁶³ Career PLA scientists can also hold appointments as CAS academicians. A famous example is Wu Zuze, the former president of the PLA AMMS and the "father" of the study of blood generating stem cells in China,¹⁶⁴ who became a CAS academician in 1993.¹⁶⁵

MILITARY-CIVIL FUSION STRATEGY: THE CATALYST FOR AN EXPANDING PLA-CAS PARTNERSHIP

While the PLA's utilization of civilian expertise to advance its research agenda is not a new phenomenon, the emergence of a doctrine called Military-Civil Fusion (MCF) has placed greater emphasis in recent years on the systemization of this practice across the national economy and civilian research apparatus. CCP leaders, particularly Xi Jinping,

view the current decade as a potentially decisive period in a zero-sum race with the United States for global technological dominance in both civilian and military domains.¹⁶⁶ In March 2015, Xi elevated MCF to a national development strategy, a move aimed at winning this technological race, after he warned the PLA in December 2014 that China was lagging behind the United States.¹⁶⁷ In 2017, Xi sought to energize the implementation of the MCF strategy by establishing the Military-Civil Fusion Development Commission (MCFDC), chaired by Xi himself, under the CCP Central Committee. Xi has used the MCFDC to overcome resistance from vested interests, especially state-owned defense contractors, delineate MCF roles and responsibilities across the government and the PLA, promulgate policy directives, and compel provincial and municipal governments to form local-level MCF development committees,¹⁶⁸ but MCF remains a work in progress.

MCF first appeared in a CCP work report in 2007 under Hu Jintao's leadership. Xi's full embrace of MCF reflects a consensus between the current and previous CCP leadership that MCF is the "new prescription" for achieving the goal of making China affluent and militarily dominant in the 21st century.¹⁶⁹ MCF provides the essential backdrop against which the PLA's involvement with the CAS, including the WIV, should be understood, because CCP and PLA leaders view MCF as the primary force that will drive the technological innovation needed to surpass the United States.¹⁷⁰ As Hou Guangming, a Chinese scholar of MCF, explained: "From the state's perspective, the global revolution in military affairs continually promotes upgrades in high-tech weaponry, and the core of military competition is changing toward science and technology."¹⁷¹

MCF stems from a widely held view among PLA strategists that the blurring of the lines between civilian and military technology is a fundamental characteristic of modern warfare, with upwards of 80 percent of technologies powering the equipment used by modern militaries being dual-use in nature.¹⁷² MCF seeks to break down barriers between civilian and military institutions, and to mobilize the former in service of the latter.¹⁷³ MCF facilitates the two-way transfer of technology, resources, information, and personnel between military and civilian entities.¹⁷⁴ Bai Chunli, former president of the CAS, summed it up well when he observed: "The boundary [between the civilian and military] in aspects such as personnel, platforms, and technologies gets blurrier by the day [because of] the deep fusion of military and civilian science and technology and its coordinated innovation."¹⁷⁵

MCF's mobilization of civilian resources for military purposes is a policy response to the practical challenges of trying to build a high-tech military. One such challenge is the PLA's persistent shortage of personnel with science, engineering, and technical backgrounds.¹⁷⁶ As Xi Jinping noted in 2017, "the scale of skilled personnel and troops in our military has improved greatly, but there is an extreme shortage of strategic scientists and talented science and technology leaders, and a complete lack of top talent."¹⁷⁷ By utilizing expertise based at civilian research institutes, universities, and the private sector to develop dual-use technologies, the PLA hopes to mitigate the effects of its shortfall in personnel with science and technology backgrounds. Another challenge is the massive level of R&D spending that is needed to establish technological preeminence, hence MCF's emphasis on efficient allocation and use of public resources. The PLA's budget, although second only to the U.S. military in size, cannot meet these R&D spending demands alone, and it was such resource constraints that prompted the CCP to focus on leveraging the spending power of the broader economy, as well as state funding for civilian research institutions and universities, to develop dual-use technologies that benefit the PLA.¹⁷⁸

Dual-use research collaboration between the CAS and the PLA is ongoing and formalized, and has expanded since 2015 as a result of MCF. The CAS sits "at the center of this burgeoning web of civil-military academic linkages,"¹⁷⁹ a web that has been slowly forming for decades, but which has accelerated rapidly under Xi Jinping. The MCF Research Center at the PLA AMS boasts a close working relationship with the CAS.¹⁸⁰ In March 2018, the CAS and the AMS signed a strategic cooperation framework agreement in which the two committed to "jointly establish a high-end strategic think tank, jointly launch collaborative research projects, jointly promote the establishment of a coordinated innovation platform, and jointly cultivate talent and accelerate the exchange of personnel, and other aspects of deep cooperation."¹⁸¹ CAS President Bai Chunli said the agreement was a "concrete measure" taken in response to Xi's remarks at the first meeting of the MCFDC in June 2017.¹⁸²

In the speech that Bai referenced, Xi explained MCF's importance as such: "The elevation of military-civil fusion development to a national strategy is a significant outcome of our long-term search for a pattern of coordinated development to build the economy and national defense..., a response to complex security threats, and a major move to gain the strategic advantage for the nation.... [We must] accelerate the formation of an all-factor,

multidisciplinary, highly efficient structure for deep military-civil fusion development, step-by-step setting up a national strategic system and capabilities that fully integrate the military with the civil.”¹⁸³ Xi also identified biotechnology as ripe for MCF development:

Marine [science], outer space, cyberspace, biology, new energy, and other fields have strong military-civilian interoperability. It is necessary to implement the concept and requirements of military-civil fusion throughout the whole process of planning, design, organization and implementation, and the application of [research] results. We should work hard to solve outstanding problems and accelerate the formation of the military-civil fusion development pattern in emerging fields through multi-dimensional integration, coordinated promotion, and leapfrog development.¹⁸⁴

In March 2017, Xi Jinping spoke to the PLA’s delegation to the National People’s Congress (NPC),¹⁸⁵ and singled out the CAS as a special resource that must be utilized for the MCF strategy to succeed: “You must also bring into full effect the potential of the Chinese Academy of Sciences, high-ranked universities and colleges, and civilian and private enterprises in order to achieve the military use of civilian [resources] to the maximum degree.”¹⁸⁶ Later in the same speech, Xi specifically pointed to “local research and development academies and institutes,” a general category to which the WIV belongs, as a source of “R&D advantages” for the PLA to utilize.¹⁸⁷ Both in this speech and on other occasions in 2017, Xi invoked the historical role that CAS played in the PLA’s satellite and nuclear weapons programs to illustrate his point about the importance of CAS to MCF: “In those days, if we had not had that group of great scientists such as Qian Xuesen, Qian Sanqiang, and Deng Jiaxian, ‘Two Bombs, One Satellite’ would have never made it.”¹⁸⁸

In December 2017, the PLA Daily ran an article called “How to Transform the Research and Development Achievements of the Chinese Academy of Sciences into Military Products?,” reporting on a meeting held at the CAS Dalian Institute of Chemical Physics, apparently in response to Xi’s aforementioned remarks to the PLA in March. Over 200 leaders from the PLA (including the AMMS), the government, the CAS, state-run think tanks, and private industry attended.¹⁸⁹ The CAS had “made irreplaceably important

contributions” to national security, the PLA Daily wrote, citing the nuclear weapons program as the most famous example.¹⁹⁰

The PLA Daily report stressed: “[A]side from participating in major defense science and technology special projects [to develop] the famous technologies, inside the massive R&D system of the Chinese Academy of Sciences, there is an ocean of R&D achievements. Among these are many excellent technologies that not only have enormous value for civilian use, [but] the prospects for military use are absolutely vast as well.”¹⁹¹ The report discussed the formation of MCF leading groups within CAS institutes, which had already identified 53 existing projects as having military applications, including biotechnology, at two CAS institutes in the cities of Dalian and Qingdao.¹⁹² Luo Yongguang, the director of the MCF Development Center at the PLA National Defense University, spoke to the gathering and made it clear that PLA R&D priorities must take precedence over civilian goals: “[Civilian] R&D academies during the process of participating in military-civil fusion must insist on military requirements as the driving force.”¹⁹³

Five months later in May 2018, Xi Jinping spoke directly to a plenary meeting of CAS and CAE academicians about their role in the MCF strategy and the indigenous development of dual-use technology. Xi told the CAS and CAE to closely coordinate their efforts to innovate with those of the PLA: “We must exert ourselves to push forward with the fusion [approach] to the development of the economy and national defense, deepen the systematic reform of the national defense science and technology industry, enhance our capability to coordinate military-civil innovation, and improve the mechanisms to coordinate military-civil innovation.”¹⁹⁴ Xi further called on the CAS and the CAE to “accelerate the construction of the military-civil fusion development system...[in order] to eliminate obstacles to ‘the civilian participating in the military’ and the ‘military transferring to the civilian.’”¹⁹⁵

MCF, BIOTECHNOLOGY, AND WUHAN

As we have seen with the 863 Program and Made in China 2025 economic plan, biotechnology is also designated a priority research area for the MCF strategy. In 2017, the Central Military Commission’s Science and Technology Committee and the MOST issued a five-year “special plan for science and technology MCF development,” calling for systematizing a MCF approach to basic R&D for biotechnology and seven other target

fields. Biology was further designated as a field for which MCF special projects would be authorized.¹⁹⁶ In his 2018 address to the CAS, Xi Jinping highlighted how the life sciences and biotechnology, particularly synthetic biology, gene editing, neuroscience, and regenerative medicine, were “giving birth to a new transformation.”¹⁹⁷ During his March 2017 address to the PLA on “promoting technology to revitalize the military,” Xi spoke of biotechnology twice, and emphasized that the “intersection of artificial intelligence, network information, and biology” was the focus of a “fierce contest” between major powers vying for the lead in emerging technologies, a situation that required the CCP and PLA to “strengthen our sense of urgency.”¹⁹⁸

In August 2018, four PLA AMMS researchers wrote an article touting the potential of biopharmaceutical research for MCF development and noted that efforts to bring MCF to bear on this field had “received broad approvals at high levels” of the CCP.¹⁹⁹ They described biopharmaceuticals as well-suited for MCF:

The military-civil, dual-use nature of biopharmaceutical science and technology is strong. It has natural properties for military-civil fusion, and is easy to fuse, therefore we should strengthen the alliance between local governments and the military in a mutual exchange of assistance, with coordinated overall planning...bringing into effect the powerful advantages of each side in order to achieve full-chain fusion from research and development planning, project applications, cooperative development, application of results, and resource sharing.²⁰⁰

The construction of national laboratories, like the Wuhan BSL-4 lab, would be instrumental in this regard: “Make military-civil fusion in the field of biopharmaceutical science and technology an important foundation and a mission goal to guide the construction of national laboratories [in order to] accelerate the transformation of combat capabilities....”²⁰¹

In 2015, the General Office of the CCP Central Committee and the General Office of the State Council selected Wuhan as one of only three provincial capitals nationwide that would host pilot reform experiments to promote technological innovation and “accelerate the development of in-depth military-civil fusion.”²⁰² In their 2020 work report, the Wuhan authorities continued to stress the importance of MCF. The city set a goal to establish a “New Model Zone for National Military-Civil Fusion Innovation,”

and urged local officials to “accelerate the deep development of military-civil fusion and support the two-way transfer and transformation of military-civil, dual-use technologies.”²⁰³

Comments made by a CCP official at the WIV in September 2018 illustrated how the WIV is situated at the intersection of the development of the biotech industry in China and the advancement of the PLA’s biodefense capabilities: “Compared to other industries, the development of the biopharmaceutical industry [in China] is even weaker. The institute’s building of the Center for Biosafety Mega-Science must be oriented towards the main battlefields of the national economy, aligned with the needs of the state, [and] bring into full effect the important functions of solving human epidemic diseases and protecting the biosecurity of the state.”²⁰⁴

THE WIV AND THE PLA AMMS

The WIV is a state-run and largely state-funded research facility. This status subjects the WIV to mobilization in support of dual-use and classified military research projects, and while this arrangement has existed for decades, it has received a renewed mandate under the rubric of MCF discussed above. It is important to remember that the WIV’s BSL-4 laboratory complex was China’s first biocontainment lab built to study the world’s most dangerous pathogens,²⁰⁵ and is part of a new system of national laboratories, many of which are CAS facilities, under development for the express purpose of combining work in both civilian and defense-related fields as well as encouraging multidisciplinary research.²⁰⁶ The WIV reportedly houses a Military Management Division, though since the outbreak of the pandemic, references to this division have been removed from the WIV website.²⁰⁷

The WIV maintains a collaborative relationship with the PLA AMMS that is routine and robust, which can be seen from its professional research publications. For example, a curiously timed paper titled “Molecular Mechanism for Antibody-Dependent Enhancement of Coronavirus Entry,” which its authors submitted for publication in November 2019, featured WIV coronavirus expert Shi Zhengli and her team member Chen Jing partnering with PLA AMMS scientists Zhou Yusen, Sun Shihui, He Lei, and Chen Yuehong.²⁰⁸ Earlier in 2019, a WIV research group led by Peng Ke partnered with a PLA AMMS research group led by Liu Wei to study the role of calcium channel blockers

in reducing fever in patients suffering from thrombocytopenia syndrome virus.²⁰⁹ A total of 10 PLA researchers participated, eight of whom worked for AMMS.²¹⁰

In 2017, Shi Zhengli and 10 other WIV researchers joined forces with 13 PLA AMMS researchers to conduct a study funded in part by the U.S. National Institutes of Health (NIH) and the U.S. Agency for International Development (USAID) that found a bat coronavirus to be the cause of a fatal diarrhea syndrome among swine.²¹¹ In 2015, WIV researcher Wang Hanzhong won an award from the PLA General Logistics Department for his “close cooperation” with the PLA AMMS and the PLA No. 302 Hospital on a study of emerging pathogens that infect the respiratory channel and intestinal track.²¹² These examples of WIV-AMMS collaboration were drawn from the public domain and are by no means exhaustive. The WIV has further engaged in classified research, including laboratory animal experiments, on behalf of the PLA since at least 2017.²¹³

Personnel employed by the PLA AMMS appear to maintain a working presence at the WIV, and in some cases, serve in institutional roles. An example of the latter is Colonel Cao Wuchun, the Executive Director of PLA AMMS Institute of Microbiology and Epidemiology, who sits on the scientific advisory committee for the WIV Center for Emerging Infectious Diseases led by coronavirus expert Shi Zhengli.²¹⁴ Two other PLA scientists also served on that advisory committee: AMMS microbiologist Tong Yigang, who has an appointment at Beijing University of Chemical Technology, and Tu Changchun of the AMMS Institute of Military Veterinary Medicine.²¹⁵ AMMS virologist Zhou Yusen, Shi’s collaborator in the aforementioned 2019 project, worked with the WIV, and likely at the WIV episodically for several years.²¹⁶ A WIV report from 2016 identified Zhou and one of his doctoral advisees as key partners in a study that sought to develop a vaccine for MERS-CoV.²¹⁷ It is conceivable that Zhou could have been working at the WIV in 2019 when the research was being conducted for the paper that he coauthored with Shi Zhengli and Chen Jing on antibody-dependent enhancement of coronavirus entry.

Some WIV researchers were trained by the PLA AMMS. Qiu Yang spent almost five years at the PLA AMMS Institute of Microbiology and Epidemiology doing post-doctoral research just prior to joining the WIV in 2018. He works on coronaviruses, among other pathogens.²¹⁸ Another example of the PLA AMMS operating at the WIV appeared in connection to China’s response to the outbreak. On January 30, 2020, the PLA

acknowledged that it had dispatched a team of AMMS experts led by epidemiologist and virologist Major General Chen Wei to guide the emergency response in Wuhan.²¹⁹ Chen reportedly took control of directing the operations of the WIV for some period of time following her arrival in Wuhan.²²⁰ The fact that Beijing tapped Major General Chen, not George Gao or another of its accomplished civilian scientists, to seize the reins at the WIV further implies that the PLA already had an established role there.²²¹

Some reports suggest the PLA AMMS was planning to utilize the WIV's BSL-4 laboratory years before the construction was completed. In 2008, two officers from the Department of Science and Technology at the PLA AMMS published an article that described the importance of collaboration with civilian research centers. Among other things, they advocated for a unified biological defense system that would pool the resources of the PLA and local governments and be managed from the central level down to provincial and local governments all around China. In the same vein, they called for the "building of a well-developed working network of state-military coordination in branch laboratories of various [BSL] levels nationwide."²²² In keeping with the "principle of military-civil integration," the authors stressed the importance of "constructing the necessary high-level biosafety (BSL-3 and BSL-4) laboratories, and strengthening the construction of these laboratories' facilities and technological equipment to raise the capability of the laboratories to monitor and test important pathogenic microorganisms."²²³ When this article was written, China had no BSL-4 laboratory, but what would become the first, the Wuhan National Biosafety Laboratory, had been under construction for four years.²²⁴ It thus stands to reason that these AMMS authors had the WIV in mind when drafting the statements quoted above.

THE WIV AND THE WUHAN INSTITUTE OF BIOLOGICAL PRODUCTS

Another reflection of the research nexus between the WIV and the PLA AMMS, particularly in vaccine development, can be seen in the longstanding, symbiotic relationship between the WIV and the neighboring Wuhan Institute of Biological Products (WIBP). The WIBP is a large vaccine research and production facility that was founded by the Central Military Commission in 1950.²²⁵ It is currently owned and operated by a subsidiary of the state-owned megacorporation Sinopharm.²²⁶ The WIBP played an important role in researching vaccines for SARS-CoV-1, and its BSL-3 laboratory, one of the country's first, was working on SARS as early as 2003.²²⁷

The WIV and the WIBP have been co-located for decades, initially at the original WIV campus in Wuchang District. Beginning in 2009, the WIBP relocated its entire operations to the WIV's new campus at the Zhengdian Gold Industrial Park in Jiangxia District, a move that was completed in 2016, likely in conjunction with the opening of the BSL-4 lab.²²⁸ The WIV and the WIBP are connected by more than proximity. As early as 2008, the WIV organized a "Wuhan Emerging Infectious Diseases Research Coalition" that included experts from the WIBP and local universities and hospitals.²²⁹ In 2014, the director of the WIV and the president of the WIBP pledged to increase "strategic cooperation" between the two entities, particularly in the areas of research, development, and production of biotechnology and personnel training and exchange.²³⁰

Beyond the fact that it was founded by the Central Military Commission, ongoing ties between the WIBP and the PLA have been reported throughout its history. In 1993, the PRC government declared to the BWC that the WIBP was one of seven vaccine production facilities that were part of a "national defensive biological warfare R&D program."²³¹ In 2001, Taiwanese intelligence told an American expert on biological and chemical warfare that the WIBP was not merely a vaccine producer, but was also involved in the "cultivation of various bio-warfare agents."²³² In a 2015 study, a retired Israeli intelligence officer also drew a link between the WIBP and the PLA, and underscored the PLA's practice of using ostensibly civilian entities to allow it to interface more easily with international suppliers of technology and top scientific institutions in the West.²³³ This study further noted that most vaccines produced by the WIBP and other state-owned facilities under the Sinopharm umbrella are not produced by privately owned vaccine manufacturers in China, and that these vaccines happen to correspond in large part to the "essential pathogens within any bio-warfare program."²³⁴

Before we consider the WIV's problems with biosafety, it is worth noting that the WIBP has had a checkered past when it comes to quality control. In November 2017, the State Food and Drug Administration reported that sampling inspections had found that over 400,000 DPT (diphtheria, pertussis, and tetanus) vaccines produced by the WIBP were substandard and unlikely to confer immunity.²³⁵ The WIBP had sold 210,000 of these shoddy vaccines for children to the Hebei Provincial Center for Disease Control and Prevention (CDCP) and another 190,500 to the Chongqing Municipal CDCP.²³⁶ Production of DPT vaccines at the WIBP was consequently shut down until July 2018.²³⁷

PRESSURE TO PLEASE THE PARTY: XI JINPING PUTS THE CAS IN THE POLITICAL PRESSURE COOKER

In the years preceding the pandemic, political pressure had been building on the CAS. Several factors contributed to this environment at the CAS, but the first and most important factor was the “enormous pressure from the political leadership” to produce “visible achievements.”²³⁸ Such achievements refer to major scientific breakthroughs that lead to the indigenous innovation of new technologies, thereby addressing what the CCP calls the “stranglehold problem.” With relatively few exceptions, Chinese enterprises remain dependent on foreign sources of core technologies.²³⁹

CCP leaders refer to this foreign dependency as the “stranglehold problem,” which is a recurring theme of concern at the CAS, including the WIV specifically, as well as other state-run research institutions charged with meeting the science and technology goals set by Beijing. It refers to the “direct [deleterious] effects created by cutting off the supply of foreign key and core technologies” to China,²⁴⁰ which means technologies that China “must import because it is unable to produce them domestically in sufficient quality or quantity.”²⁴¹ In December 2020, as a primary goal of China’s economic plan for 2021 to 2025, Xi Jinping renewed his call for officials to “target industrial weak links, implement projects to tackle major problems with key and core technologies, and solve a series of ‘stranglehold’ problems as soon as possible.”²⁴²

More is at stake than simply reducing perceived vulnerabilities related to the supply of foreign technologies. As one group of Chinese scholars observed in a 2018 article, the CCP leadership speaks of an “urgency for China to transform its economic development model from one that is labor, investment, energy, and resource-intensive into one that is increasingly dependent on technology and innovation.”²⁴³ The CAS is critical to that economic transformation, and as China reaps fewer and fewer dividends from the resource and labor-intensive model that drove its growth from the 1980s until the early 2000s, the more the urgency builds on the science and technology research system as a whole, and the CAS in particular, to show that the reforms and investments of the past decade are bearing economic fruit.²⁴⁴ The CAS itself also feels the weight of questioning about whether it deserves the resources it consumes. Reports indicate that skepticism exists within Chinese officialdom about the wisdom of maintaining such a massive

research organization, which is far larger than anything comparable elsewhere in the world, and survives largely on the public dole.²⁴⁵

Another factor creating pressure on the CAS is the sustained attention of Xi himself. While efforts aimed at spurring innovation were underway at the CAS as early as 1998,²⁴⁶ Xi has placed great emphasis on the imperative for the CAS to lead the charge on indigenous innovation. Xi visited the CAS in July 2013, a few months after becoming paramount leader, and stressed that the academy should strive to become China's main source of innovative ideas and technological breakthroughs.²⁴⁷ He specifically urged the CAS to become a "pioneer" in four areas (the "four firsts"):²⁴⁸ "being the first to achieve leapfrog development in science and technology, being the first to build a national platform for innovative talent, being the first to build a high-level science and technology think tank in the nation, and being the first to build a world-class institution for research and development."²⁴⁹

WIV officials spoke in 2019 with some frequency about their need to show results in keeping with Xi's "four firsts" edict, and the lack of progress toward meeting the "four firsts" would emerge as a theme of a CCP investigation of the CAS in September 2019. Xi has also taken a hands-on approach to the reform of the CAS generally, to the reform of the elite academician system at CAS specifically, and to the reform of central government financing mechanisms for science and technology research, which impacts the CAS directly.²⁵⁰

While all CAS research institutes have been subjected to political pressure to produce scientific breakthroughs, it is important to note that this pressure was amplified in the case of the WIV. One reason the WIV faced particularly high expectations was its status as the home to China's first, and until 2018, only BSL-4 laboratory.²⁵¹ CCP leaders and state-run media repeatedly touted the existence of the Wuhan National Biosafety Laboratory as a milestone for China and suggested that its establishment would lead to major advances in science and public health. In addition, the CAS chose the WIV in 2014 to host the Center for Biosafety Mega-Science, one of only three large, multidisciplinary "mega-science" research centers nationwide, which were established in response to Xi Jinping's proposal that the CAS create strategically important facilities to promote collaboration across various specialties to facilitate innovation.²⁵² As we will document later in this report, WIV management repeatedly appealed to the national

importance of the BSL-4 laboratory and “mega-science” center when urging WIV research personnel to work diligently toward meeting the goals of the party-state.

PRE-PANDEMIC, SCIENTISTS ACKNOWLEDGE HISTORY OF LAB LEAKS, WARN OF RISKS

Expressions of concern about biosafety risks at the state-run WIV did not begin with speculation about the origin of SARS-CoV-2 in 2020. As early as 2015, some scientists had called into question whether the potential benefits to be gained from the WIV’s research involving the artificial manipulation and creation of chimeric coronaviruses was worth the considerable risks to public health inherent to this line of research.²⁵³ In 2017, other scientists warned of the potential dual-use applications, and worried about “pathogens escaping” in light of China’s history of laboratory leaks, particularly several incidents involving SARS-CoV-1.²⁵⁴ SARS-CoV-1 escaped from the Chinese National Institute of Virology in Beijing, an affiliate of the CCDCP, a total of four times in 2004, infecting at least two researchers, and causing a few cases of limited community spread that resulted in one death.²⁵⁵ Laboratory acquired infections of SARS-CoV-1 also occurred among researchers in Singapore and Taiwan in 2003.²⁵⁶ In November 2021, a research assistant in Taiwan became infected with SARS-CoV-2 during the course of her work in a laboratory, most likely by inhaling the virus or because she removed personal protective equipment (PPE) incorrectly.²⁵⁷

China may be responsible for the only known case of a laboratory leak giving rise to a pandemic. In 1977, H1N1 human influenza “re-emerged” in China, and later in Russia, and rapidly produced a pandemic, though deaths were few.²⁵⁸ Earlier genetic tools found that this “time-traveling throwback” was closely related to H1N1 human influenza viruses circulating in 1949-1950, but not to those that circulated before or after then.²⁵⁹ As one expert noted in a history of laboratory leaks, “it has become clear that [H1N1’s] appearance in 1977 was almost certainly due to escape from a virology lab of a virus sample that had been frozen since c1950.”²⁶⁰ Virologists then, as many remain now, were loath to confront the matter head-on: “Western virologists quietly let the matter of a laboratory escape origin for the 1977 H1N1 virus drop from discussion, out of an abundance of scientific caution, and also out of an eagerness not to offend the Russian and Chinese scientists, whose early gestures of cooperation in worldwide influenza surveillance were very important to foster....”²⁶¹ Only since 2008 have virologists started

to admit in their professional writings that the 1977 H1N1 pandemic likely resulted from a laboratory release.²⁶²

The history of laboratory leaks, both in China and elsewhere, certainly factored into concerns about gain-of-function research that grew more prominent in the years preceding the pandemic. A group of distinguished scientists called the Cambridge Working Group issued a statement in July 2014, which while not directed specifically at the WIV, urged a halt to the kind of gain-of-function research²⁶³ conducted at the WIV: “Experiments involving the creation of potential pandemic pathogens should be curtailed until there has been a quantitative, objective and credible assessment of the risks, potential benefits, and opportunities for risk mitigation, as well as comparison against safer experimental approaches.”²⁶⁴ As a result of these concerns, starting in October 2014, the U.S. government imposed a pause on federal funding for any new studies that included certain gain-of-function experiments involving influenza, SARS, and MERS viruses, and encouraged those currently conducting this type of research, regardless of the source of their funding, to voluntarily suspend their work while the risks and benefits were reassessed.²⁶⁵ The moratorium was lifted in December 2017.²⁶⁶

At times, the WIV’s work was squarely at the center of international concerns about gain-of-function research with viruses. In 2015, a team from the University of North Carolina Chapel Hill, the WIV, and other research institutions constructed a novel virus by replacing the spike protein in the backbone of SARS-CoV-1 with one extracted from a bat virus known as SHC014-CoV. They tested the chimera to see if it could infect cells in the human airway and found “robust viral replication both in vitro and in vivo.”²⁶⁷ Simon Wain-Hobson, a virologist at the Pasteur Institute in Paris, noted at the time that the researchers’ creation “grows remarkably well” in human cells, adding that “if the virus escaped, nobody could predict the trajectory.”²⁶⁸ Richard Ebright, a molecular biologist at Rutgers University, likewise assessed, “The only impact of this work is the creation, in a lab, of a new, non-natural risk.”²⁶⁹

EARLY WIV REPORTS SUGGEST LAXITY

Early reports at the WIV itself also revealed potential breaches in lab safety standards. In January 2011, an inspection of WIV laboratories working with pathogens “discovered that some research groups and support departments did not meet the standards in certain areas and had hidden safety dangers with the storage of bacterial and viral

samples and aspects of their experimental activities.”²⁷⁰ As this report will document later, the unsafe storage of bacterial and viral samples emerged as a theme of concern in 2019 and 2020, which was raised by the CCP leadership at the WIV as well as in a central directive issued to all BSL-3 and BSL-4 labs after the pandemic began.

Concerns about biosafety at the WIV continued to be raised periodically between the 2011 example cited above and the primary period of examination in this report (2018 to 2020). For example, a report about biosafety inspections at the WIV conducted in 2018 “raised safety and security management requirements to target problems that were found during comprehensive safety and security inspections,”²⁷¹ and “used recent cases of specific safety procedural [breaches] during research and development and production drawn from around the country as a warning, [and] required [the WIV] to take steps to firmly establish a security mindset as a line of defense.”²⁷²

WERE THE WIV’S BIOSAFETY LAPSES THE INEVITABLE FALLOUT FROM EXPELLING THE FRENCH?

One of the early signs that things could be going awry at the WIV was Beijing’s backtracking on the commitments it had made to Paris. During an October 2004 visit to Beijing, French President Jacques Chirac agreed that France would provide the BSL-4 laboratory’s blueprints and designs and transfer several mobile BSL-3 laboratories to China. In exchange, Beijing agreed to use a French construction firm, allows French technicians to oversee the lab construction project and the launch of operations, and to welcome 50 French scientists to work at the WIV and supervise the training of their Chinese counterparts. It was understood that much of the research conducted at these new sites would be collaborative and that all of it would be shared between researchers in the two countries.²⁷³

Chirac’s willingness to construct a BSL-4 laboratory in Wuhan reportedly elicited serious concern among defense and intelligence officials in Paris as well as their counterparts in Washington, as such laboratories and the technologies inside them are inherently dual-use. Four of the mobile BSL-3 laboratories that France transferred to China in 2004 went missing, and the PLA was believed to have taken possession of them. French and American experts feared that the BSL-4 laboratory would face the same fate.²⁷⁴ Excessive WIV procurement requests for positive pressure protective suits, which are used in BSL-

4 facilities, also raised questions about why so many suits were needed unless some portion of them were being diverted for PLA use.²⁷⁵

Tensions between Paris and Beijing soon developed as the PRC started to break the promises it had made. It used a PRC state-owned construction firm with ties to the PLA rather than Technip, the French engineering company that Beijing had agreed to use, to build the BSL-4 laboratory in Wuhan. Once sidelined and denied the oversight role it had been originally assigned, Technip pulled out of the project entirely, refused to certify the building, declaring that it could not accept any legal responsibility for the work done by the PRC firm, which may have used substandard materials and equipment.²⁷⁶ Alain Merieux, the French co-lead of the project, resigned in 2015, telling a French radio broadcaster: “I am giving up the co-presidency of the BSL-4 because it is a Chinese tool. It belongs to them even though it was developed with the technical assistance of France.”²⁷⁷

None of the 50 French researchers were ever allowed to work at the WIV. It is worth recalling that their presence was intended in part to ensure that proposed biosafety trainings were carried out and general biosafety practices adhered to international standards. Only one French scientist, Rene Courcol, a microbiologist from Lille University Hospital, was granted access in 2018 to perform a quality control and biosafety assessment. He has declined to speak to the press, and a single WIV report that mentioned his assessment provided no details as to its content.²⁷⁸ As Joseph Harriss, a Paris-based correspondent for the American Spectator, aptly put it, “Thanks to French naïveté – they actually believed Chinese promises – China got its new dual-use laboratory and the ability to do whatever it likes with it, and France got zilch.”²⁷⁹

THE CHRONOLOGY: WHAT IT IS AND WHAT IT ISN'T

With the general scene now set, let us proceed to the chronology itself. What follows is a forensic exercise chronicling events, official actions, legislative and regulatory initiatives, policy pronouncements, and speeches and remarks by relevant authorities in the PRC that pertain to biosecurity, biosafety, and public health – both as general matters and specifically in response to the outbreak of SARS-CoV-2. This exercise has been neither exhaustive nor comprehensive in scope – such a goal is unachievable in light of the PRC authorities' advanced abilities to control access to information – but we believe a sufficiently robust sample of data has been collected from the public domain to capture with a somewhat surprising degree of clarity the salient trends and events in China at the time. We have endeavored to be as complete and inclusive as possible, but almost certainly missed things of value unintentionally. This was inevitable, both as a result of the limits of time and personnel and due to the obscure nature of the subject at hand. We welcome readers to supplement this work with their own; the body of evidence we have assembled is significant, but gaps in the record remain.

Not every entry that follows should be seen as somehow directly related to the outbreak of SARS-CoV-2, because no such implication was intended by its inclusion in the chronology. Some entries beginning in 2019 are clearly related to the outbreak. Others could very well be related, but it is hard to draw a clear conclusion based on the information currently available. Some entries are most likely unrelated, or only tangentially related, but they nevertheless captured the prevailing pressures of the day and preexisting concerns about biosafety and biosecurity that may have influenced the authorities' response. To be clear, many entries appear simply for the purpose of providing broader context to the reader. The result is a report that is far from concise, and some might even call cumbersome, but there is no glide path to clarity on the origin of this virus. We could only plod patiently through the confusing morass that surrounded the initial outbreak in China in the hope that clues would be gathered along the way.

THE CHRONOLOGY: 2018

JANUARY 2018: XI JINPING TELLS CADRES TO BE ALERT FOR A "SARS-LIKE VIRUS"

On January 5, Xi Jinping gave an "important speech" at the opening of a study session on the spirit of the CCP 18th Party Congress, which is when Xi became the CCP's top leader in November 2012. All seven members of the Politburo Standing Committee, the CCP's top decision-making body, were in attendance.²⁸⁰ In April 2021, the People's Daily, the official mouthpiece of the CCP, published a piece with excerpts from various Xi speeches over the years that focused on "guarding against and neutralizing major risks." The People's Daily described Xi's speech from January 5 as having "raised eight aspects and 16 dangers, among them...[major infectious viruses like] SARS,...[which we] must also be on the alert for at all times [and] take strict precautions against.'" ²⁸¹ It appears that the text of this speech has never been published in full, and the official summary published by Xinhua on the day that the speech was delivered in 2018 did not include the quote about SARS above.²⁸²

JANUARY 2018: U.S. DIPLOMATS VISIT WIV AND REPORT SAFETY ISSUES TO WASHINGTON

After visiting the WIV and speaking with its researchers, U.S. diplomats conveyed concerns about the training of personnel and biosafety conditions at the newly constructed BSL-4 laboratory complex located on the WIV's Zhengdian Research Industrial Park campus in Jiangxia District²⁸³ in an internal cable transmitted to Foggy Bottom on January 19, according to the Washington Post.²⁸⁴ "During interactions with scientists at the WIV laboratory, they noted the new lab has a serious shortage of appropriately trained technicians and investigators needed to safely operate this high-containment laboratory," the January 19 cable stated, relaying comments from WIV researchers. The cable further cautioned that the WIV's work with bat coronaviruses potentially posed a risk of new SARS-like pandemic.²⁸⁵

MARCH 2018: MOST TOUTS DISEASE SURVEILLANCE SYSTEM AS A LESSON LEARNED FROM SARS

On March 10, Wan Gang, the PRC Minister of Science and Technology, spoke to a press conference on the subject of "accelerating the building of an innovative country." Wan discussed the SARS-CoV-1 epidemic of 2003-2004 as the impetus for the creation of a

nationwide system of proactive disease surveillance: “We gradually transitioned from passive defense to active defense in responding to the sudden outbreak of infectious disease. It has already been more than a decade since SARS, but we still have a profound memory [of it], from then we started major projects on infectious disease, and established a network of Chinese Center for Disease Control and Prevention laboratories as a special response system for sudden outbreak of infectious disease.”²⁸⁶

MARCH 2018: CAS HOLDS MEETING ON XI’S ORDER TO “DEEPEN MILITARY-CIVIL FUSION”

On March 16, the CAS in Beijing held a work meeting to mark the launch of an academy-wide program to “deepen the advancement of military-civil fusion development research” – a program that was designed in response to a direct order from Xi Jinping.²⁸⁷ The wide range of organizations represented from the party, military, and government reflected the meeting’s political importance. More than 60 participants in total attended, and they represented one office of the CCP Central Committee, three offices of the Central Military Commission, one office of the PLA AMS, four offices at CAS headquarters in Beijing, and around 30 CAS research institutes (such as the WIV).²⁸⁸

The purpose of this meeting was to start a program to better incorporate the PLA’s research goals into the work of the CAS in response to directives that Xi had issued in two speeches just days before on March 2 and March 12, leading to the “formation of a long-lasting mechanism for research on the military-civil fusion development strategy” at the CAS.²⁸⁹ Xiang Libin, the vice president of the CAS, made this point plain:

Xiang Libin’s wrap up speech emphasized that the launch of the Chinese Academy of Sciences’ Program on Deepening the Advancement of Military-Civil Fusion Development Research is the Chinese Academy of Sciences’ implementation of General Secretary Xi Jinping’s strategic instructions and requirements regarding military-civil fusion development, especially the important remarks of General Secretary Xi Jinping on March 2 of this year at the first plenary meeting of the 19th Party Congress Central Committee’s Commission on Military-Civil Fusion Development and the concrete measures contained in the important remarks delivered by General Secretary Xi Jinping on March 12 during the joint meeting with delegates from the People’s Liberation Army and People’s Armed Police to the plenary session of the 13th National People’s Congress.²⁹⁰

Xinhua's report of Xi's speech on March 2 omitted his comments about CAS.²⁹¹

Readers may recall from the background section that Xi also spoke to the PLA delegation to the NPC the year prior in March 2017,²⁹² when he singled out the CAS as a special resource to be utilized for the MCF strategy: "You must also bring into full effect the potential of the Chinese Academy of Sciences, high-ranked universities and colleges, and civilian and private enterprises in order to achieve the military use of civilian [resources] to the maximum degree."²⁹³ Given how quickly the CAS convened the aforementioned meeting following Xi's speeches on March 2 and March 12, 2018, we might infer that Xi expressed dissatisfaction, or at a minimum, called for faster progress with integrating the PLA into CAS, including by outlining "concrete measures" to this end, as Xiang Libin indicated above.

On March 22, just a week after this meeting to deepen MCF was held at the CAS, the CAS and the PLA AMS signed a strategic cooperation framework agreement in which the two committed to "jointly establish a high-end strategic think tank, jointly launch collaborative research projects, jointly promote the establishment of a coordinated innovation platform, and jointly cultivate talent and accelerate the exchange of personnel, and other aspects of deep cooperation."²⁹⁴ CAS President Bai Chunli said the agreement was a "concrete measure" taken in response to Xi's remarks.²⁹⁵ We can confidently conclude that as a result of these initiatives, the WIV and other CAS research institutes likely experienced a growing presence of the PLA and prioritization of its research agenda starting in spring of 2018 and continuing into 2019.

MARCH 2018: STATE COUNCIL REVISES BIOSAFETY REGULATIONS FOR LABS STUDYING PATHOGENS

On March 19, the State Council revised the "Biosafety Management Regulations for Laboratories that Study Pathogenic Microorganisms." First passed in 2004, the regulations were updated once in February 2016 before the second revision occurred in March 2018.²⁹⁶ The 2018 updates focused on strengthening and clarifying regulations of BSL-3 and BSL-4 laboratories, perhaps in anticipation of the opening of the nation's first BSL-4 lab at the WIV. These revisions also suggested that some laboratories had engaged in research with highly pathogenic microorganisms without state authorization, and that the state was concerned about the spread of infectious disease as a result. In

fact, punitive measures, including criminal penalties, were added to the regulations to address safety incidents that lead to an outbreak of infectious disease.

Here are some of the relevant changes:

1. Article 22 was revised from “laboratories that have obtained the qualification certificate for experimental activities with highly pathogenic microorganisms” to “Level 3 and Level 4 laboratories.”²⁹⁷
2. A new reporting requirement was inserted into Article 26: “The supervisory health department and veterinary department of the State Council shall regularly summarize and inform each other about the number of laboratories, the establishment and distribution of laboratories, and the status of laboratory activities involving highly pathogenic microorganisms in Level Three and Four laboratories.”²⁹⁸
3. Article 56 was amended to read:

If a Level 3 or Level 4 laboratory has not been authorized to conduct experimental activities with certain types of highly pathogenic microorganisms, or microorganisms that are suspected of being highly pathogenic, the supervisory health department or veterinary department of the local people’s government at the county level or above shall, in accordance with their respective duties, order the cessation of relevant activities, supervise the destruction of pathogenic microorganisms used in experimental activities, or send them to the storage facility, and issue a warning [to the laboratory]. For those incidents that cause the transmission and spread of an infectious disease or other serious consequences, the main person responsible, the supervisory personnel who are directly responsible, and other directly responsible personnel shall be punished by dismissal from their position or termination in accordance with the law. For those incidents that constitute a crime, criminal culpability shall be investigated according to the law.²⁹⁹

4. Article 61 was revised from “the original certificate-issuing department shall revoke the laboratory’s qualification certificate for engaging in experimental activities with highly pathogenic microorganisms” to “[the department] shall order the cessation of the [prohibited] experimental activity, and the laboratory

shall not apply to engage in experimental activities with highly pathogenic microorganisms for two years.”³⁰⁰

A 2018 study of biosafety conditions at laboratories in the municipality of Zhangjiajie in Hunan Province, approximately 330 miles southwest of Wuhan, may provide some insight into the types of problems prevalent at laboratories in China that led to the regulatory revisions above. The purpose of the study, which was conducted by a team of researchers at the Zhangjiajie Municipal CDCP and Municipal Health Commission, was to “understand the biosafety conditions at laboratories studying pathogenic microorganisms in Zhangjiajie, to analyze prominent problems currently faced by laboratories studying pathogenic microorganisms in Zhangjiajie, and to identify countermeasures to eliminate hidden dangers with biosafety in laboratories.”³⁰¹ After inspecting 37 laboratories in the municipality, the researchers concluded the following: “Our findings allow for no optimism about biosafety conditions at laboratories in Zhangjiajie. There are many hidden safety dangers, including occupational exposure, hospital acquired infections, environmental hazards, lack of training, those without credentials taking posts, management systems that do not operate effectively, leadership that does not place enough importance [on lab safety], deficient supervision and management by relevant health departments, etc.”³⁰²

MARCH 2018: WIV PROPOSES TO CREATE VIRUS WITH UNUSUAL SITE FOUND IN SARS-COV-2

On March 24, the New York-based EcoHealth Alliance, in partnership with the WIV, virologist Wang Linfa (a native of China who is based in Singapore), and Professor Ralph Baric at the University of North Carolina Chapel Hill, submitted a proposal for a project called DEFUSE to be considered for funding from the Committee for Preventing Emerging Pathogenic Threats at the Defense Advanced Research Projects Agency (DARPA).³⁰³ They requested \$14.2 million for a study that would take the most interesting spike proteins that the WIV collected from unpublished SARS-related coronaviruses circulating in bat colonies in Yunnan province, and create full-length infectious clones that they would test in human airway cultures and transgenic mice expressing the human ACE2 receptor.³⁰⁴ Most significantly, the team proposed to artificially insert protease cleavage sites, specifically furin cleavage sites (FCS), into the unpublished bat coronaviruses to test whether such insertions would affect the ability of the viruses to jump to humans.³⁰⁵

SARS-CoV-2, the virus that causes COVID-19, has an FCS, which is a four-amino acid insert at the junction of the receptor-binding (S1) and fusion (S2) domains of the spike protein. It is the first known SARS-related coronavirus (sarbecovirus lineage) to possess such a site.³⁰⁶ The FCS plays a critical role in the replication, transmissibility, and pathogenesis of SARS-CoV-2.³⁰⁷ It is not yet clear to scientists how this particular site appeared in a sub-genre of coronaviruses in which such sites have never been observed. In the words of Cornell University Virologist Gary Whittaker, “So far, a viable natural origin for the SARS-CoV-2 S1–S2 site through recombination or mutation of a bat-origin virus has proved to be elusive.”³⁰⁸

While we cannot conclude with confidence on the basis of currently available information that the insertion of the FCS into SARS-CoV-2 was the deliberate result of an experiment at the WIV, the proposed work described above sets the insertion of FCS sequences into SARS-like viruses as a specific goal.³⁰⁹ Moreover, we also know that Shi Zhengli’s research team at the WIV would have been familiar with past experiments involving the successful insertion of an FCS sequence into SARS-CoV-1 and other coronaviruses, and they had ample experience of their own with the construction of chimeric SARS-like viruses. In addition, the WIV team would have been aware of published work done by researchers at the University of North Carolina Chapel Hill – frequent collaborators with the WIV – involving the FCS sequence and the FCS-dependent activation mechanism of human ENaC, which experts have noted is “perfectly identical” to the FCS sequence found in SARS-CoV-2.³¹⁰

For the purpose of this study, it is important to note how the DEFUSE proposal described the intended role of the WIV. It indicated that Shi Zhengli’s team would “conduct viral testing on all collected samples, binding assays, and some humanized mouse work.”³¹¹ While DARPA declined to fund this project in part due to concerns about the risks of such gain-of-function research,³¹² Shi and her team could have completed the work with funding they received from PRC authorities around the same time period for what appear to have been similar proposals (see section below: “January 2019: WIV Team Wins State Funding to Study Bat SARS-Related Coronaviruses”).

The serial passaging in humanized mice, in particular, could have presented a risk for accidental infection if the work were done under BSL-2 conditions, if proper protocols were not followed carefully under BSL-3 conditions, or if an equipment failure occurred,

such as an unperceivable containment breach in the biosafety cabinet that housed the humanized mice. A patent that the WIV filed in November 2020 suggests that the WIV may have experienced just such a breach.³¹³ It is conceivable that a researcher could inhale infectious aerosol particles produced by humanized mice, which in the case of SARS-CoV-2, would likely be present in the air even before symptoms of illness were evident in the mice, as demonstrated by a recent experiment involving SARS-CoV-2 and Syrian hamsters.³¹⁴ Professor Baric further explained in a 2021 interview: “Historically, the Chinese have done a lot of their bat coronavirus research under BSL-2 conditions. Obviously, the safety standards of BSL-2 are different than BSL-3, and lab-acquired infections occur much more frequently at BSL-2. There is also much less oversight at BSL-2.”³¹⁵

APRIL 2018: NATIONAL SECURITY EDUCATION DAY MARKED BY “APPROACH BIOSAFETY” ACTIVITIES

On April 15, PRC authorities held the third annual National Security Education Day,³¹⁶ and for the second year in a row,³¹⁷ the CCDCP held various activities to increase public awareness of the importance of biosafety and biosecurity. One aspect of the campaign in some localities was “preventing leaks of national secrets.”³¹⁸ It appears that the CCDCP also took advantage of the occasion to gain greater visibility into biosafety conditions in the laboratories run by the PLA. Xinhua noted that the CCDCP “through lectures, exhibitions, tours of biosafety laboratories, and other various forms entered military bases and campuses.”³¹⁹

MAY 2018: XI JINPING GIVES SPEECH TO CAS

On May 28, Xi Jinping delivered a speech to a plenary assembly of academicians at the CAS and the CAE. It contained four themes of note for the purposes of this study. The first point Xi made was to stress that the CCP alone is in charge of the scientific enterprise in China: “We uphold the party’s leadership of the science and technology enterprise, strengthen the party’s system of leadership of science and technology work, and bring into full effect the political advantages of the party’s leadership.”³²⁰

The second point was Xi’s overwhelming emphasis on the imperative for the CAS and CAE to produce cutting-edge technologies indigenously to address the so-called “stranglehold” problem:

Concentrate your efforts in the critical fields and the places where we face a stranglehold, assemble the power of your elite [scholars] to make strategic arrangements that will achieve breakthroughs as soon as possible, do all that you can do to bring about the strategic transformation of our country's overall level of science and technology [development] from playing catch-up to running alongside [the major powers] to taking the lead, in important areas of science and technology become the leader in the race, become a pioneer in the emerging interdisciplinary fields to create more competitive advantages.³²¹

Xi repeatedly stressed that time was of the essence, noting "science and technology has never before so profoundly affected the nation's prospects and destiny as it is doing today,"³²² and urging action lest "some historic periods of confluence could possibly brush past us."³²³

The third theme was the importance Xi placed on national laboratories and mega-science centers to the success of his drive for indigenous innovation: "We must build national laboratories to a high standard, promote the overall planning for the distribution and optimization of mega-science planning, mega-science projects, mega-science centers, and bases for international science and technology innovation."³²⁴ This statement directly implicated the WIV, as its Center for Biosafety Mega-Science is one of only three such mega-science centers promoted by Xi nationwide.³²⁵

The fourth theme of note was the need for the CAS and the CAE to adhere to the national development strategy of military-civil fusion as a key driver of indigenous innovation:

The vast majority of engineering, science, and technology workers must have the spirit of a craftsman, and must also have a spirit of solidarity, focusing on the major strategic requirements of the state [and] the major engineering and science and technology problems aimed at economic development and matters of national security, adhering closely to...the demands of military-civil fusion, accelerating the transformation of the results of indigenous innovation into applications, and engaging in active warfare in the strategic and forward-looking fields."³²⁶

For more information on this speech as it related to the MCF strategy, see the subsection above, "Military-Civil Fusion: The Catalyst for an Expanding PLA-CAS Partnership."

JUNE 2018: SCIENCE AND FINANCE MINISTRIES **ISSUE DIRECTIVE** TO STATE KEY LABORATORIES

On June 22, the PRC MOST and the Ministry of Finance issued a joint nationwide directive titled “Several Opinions on Strengthening the Construction and Development of State Key Laboratories.”³²⁷ The purpose was to direct state key laboratories, a category that has included the WIV since 2005,³²⁸ to reform in ways that would spur indigenous innovation and propel China to the forefront of global science and technology development. The directive described areas in which these labs were seen as falling short of the party-state’s goals: “[W]hen measured against the requirements [of the state] to improve basic science research and build a global technological power, we are still lacking in major innovative achievements, we do not have enough world-class leading scientists, and the management institutions and mechanisms urgently need to be improved.”³²⁹

The call for improvements to the management of laboratories echoed the statements of many other officials and leading scientists who warned of regulatory gaps and other oversight failures. The directive further stipulated that “strengthening coordinated innovation and promoting military-civil fusion” were among the “basic principles” that scientists at state key laboratories should uphold.³³⁰ It specified that such fusion would involve “military-civil joint construction [of labs]” as part of efforts to “optimize adjustments” to the system of state key laboratories.³³¹ This directive’s description of “military-civil joint construction” of laboratories as an element of MCF may be a reflection of the PLA’s apparent ties to the PRC state-owned company that took over the construction of the BSL-4 laboratory complex at the WIV, pushing out the French firm that Beijing had originally contracted for the project.³³² For more information on the MCF strategy and the collaboration between the WIV and the PLA, see the preceding background sections: “The WIV and the PLA AMMS,” and “Military-Civil Fusion Strategy: The Catalyst for an Expanding PLA-CAS Partnership.”

JULY 2018: XI JINPING ISSUES **“IMPORTANT INSTRUCTIONS”** FOLLOWING VACCINE SCANDAL

On July 20, public outrage erupted after the Jilin Provincial Food and Drug Administration issued a report that the Changsheng Biotechnology Co. Ltd. in the city of Changchun, the capital of Jilin, sold 252,600 doses of ineffective DPT vaccines to inoculate children against diphtheria, whooping cough, and tetanus.³³³ On July 23, an investigation found that the company had further falsified reports on the production and

inspection of some 113,000 rabies vaccines.³³⁴ Premier Li Keqiang released a statement that scolded the company for having “violated a moral bottom line,” and vowed to “resolutely crack down” on such threats to public health.³³⁵ Later that same month, Xi Jinping issued “important instructions” in which he “stressed that party committees and governments at all levels are duty-bound to ensure the safety of medicines, place the top priority on the physical health of the people from the beginning to the end..., improve our country’s vaccine management system, resolutely hold to the bottom line of safety, giving one’s all to safeguard the direct interests of the masses and the big picture of security and stability of society.”³³⁶

AUGUST 2018: CONFLICTING START DATES FOR BSL-4 OPERATIONS AT THE WIV

It is not clear exactly when BSL-4 operations began at the WIV’s laboratory complex at its Zhengdian campus. The BSL-4 lab “formally entered into operations” in August 2018, according to a November 2020 report on the official website of the CAS, the parent organization of the WIV.³³⁷ However, Yuan Zhiming, the director of the WIV’s BSL-4 laboratory, wrote in September 2019 that “the laboratory became operational in early 2018.”³³⁸ A Xinhua English report citing the national health authorities claimed the BSL-4 lab opened on January 4, 2018.³³⁹ An official report from the NPC claimed the BSL-4 laboratory at the WIV “formally entered into operations in 2017.”³⁴⁰ Conflicting reports about when exactly the WIV’s BSL-4 laboratory began operations raise questions about whether safety inspections had been completed in full before experiments with dangerous pathogens began. Similar discrepancies were found with regard to the timing of the accreditation of the BSL-4 lab. See below: “November 2018: Conflicting Accounts of the Accreditation of the WIV’s BSL-4 Laboratory.”

AUGUST 2018: NPC INSPECTS PROVINCES FOR IMPLEMENTATION OF INFECTIOUS DISEASE LAW

On August 20, the official magazine of the NPC reported on the work conducted by the “Infectious Disease Prevention Law Enforcement Inspection Team” since its formation in the spring of 2018.³⁴¹ The inspection team split into four smaller groups to carry out on-the-ground inspections in eight provinces between May and July 2018. They traveled to Yunnan, Guangdong, Sichuan, Fujian, Jilin, Shaanxi, the Inner Mongolian Autonomous Region, and the XUAR. Each of the four teams were led by vice chairs of the NPC Standing Committee and were tasked with inspecting how the provinces were

performing in areas such as enforcing infectious disease prevention laws, formulating supplementary regulations at the local level, raising public awareness, managing the quality of vaccine production, establishing local mechanisms and capacity building for disease prevention and control, and assessing vaccination rates.³⁴²

This effort was clearly undertaken in response to the vaccine safety scandal that occurred at the Changsheng Biotechnology Co. Ltd. in Jilin province, but it is noteworthy that the focus was much broader, targeting infectious disease control and prevention generally, and covering seven provincial-level jurisdictions beyond Jilin. The report noted that China had 41 BSL-3 laboratories at the time, and its first BSL-4 laboratory, the Wuhan National Biosafety Laboratory at the WIV, “formally entered operations in 2017.”³⁴³

SEPTEMBER 2018: WIV DISCUSSES ITS “SHORTCOMINGS” AND THE “STRANGLEHOLD PROBLEM”

On September 10 and 14, the WIV held political study sessions at which a number of its strategic goals and challenges were discussed.³⁴⁴ Brief reports of the meetings posted on the WIV’s website brought into clear focus the state-run nature of the WIV, including its obligations to meet goals set by the central CCP authorities in Beijing. It further suggested that the WIV leadership was already aware of problems that could later have implications for biosafety and biosecurity – problems that would be discussed with greater frequency and urgency in 2019.

Chen Xinwen, director of the WIV from 2008 to late 2018, was described as having brought attention to unspecified “shortcomings and inadequacies in the current work at the CAS,”³⁴⁵ and having “highlighted the imperative to tightly grasp the critical [technological] fields and the ‘stranglehold’ problem that affects the overall situation of the nation and its long-term development.”³⁴⁶ The “stranglehold problem” is a recurring theme of concern at the WIV and among other state-run research entities charged with meeting the science and technology goals set by Beijing. It refers to the “direct [deleterious] effects created by cutting off the supply of foreign key and core technologies” to China,³⁴⁷ which means technologies that China “must import because it is unable to produce them domestically in sufficient quality or quantity.”³⁴⁸

In 2013, Xi Jinping gave remarks that revealed his thinking about the “stranglehold problem,” and articulated the expectations that he placed on Chinese scientists to overcome it:

Overall, there is a disparity between our science and technology and that of developed nations. We must adopt an “asymmetric” strategy to catch up and surpass [them], bringing into full effect our advantages, especially for those core technological fields that we cannot possibly catch up in even by 2050.... In the international arena, those without the advantages of core technologies will also be without political power. In the critical fields, we must concentrate our efforts on the stranglehold areas. Military matters are also the same.³⁴⁹

Returning to the WIV meeting, Chen Xinwen went on to state:

[T]he institute should, under the leadership of the CAS party branch, go further to clarify the line of thinking about its development and the focal points of its work for the upcoming period, and push forward with the establishment of the Center for Biosafety Mega-Science..., complete the work of setting up a system to manage secrets at the institute..., [and] earnestly grasp the building of grassroots party organizations in order to provide a strong political and organizational guarantee for the institute’s science and technology innovation.³⁵⁰

Xiao Gengfu, secretary general of the CCP committee at the WIV, added the following comments:

The current situation for science and technology in our nation is pressing, the challenges are pressing, [and] the mission is pressing. We must persist with the principle of being directed by the requirements [of the state] from the beginning to the end, directed by the problems, directed toward the goals, looking toward the needs of the state, clarifying our own research and development orientation, and with the utmost effort, seek[ing] to solve our shortcomings and the ‘stranglehold’ problem, and mak[ing] contributions to the nation-state, to the people, and to the achievement of the great rejuvenation of the Chinese race.³⁵¹

He Changcai, deputy secretary of the WIV’s CCP Committee, also highlighted the top-down nature of science policy in China: “We must deeply study the spirit of General Secretary Xi Jinping’s important speeches on science and technology innovation, and earnestly meet the CCP Central Committee’s and State Council’s new requirements and deployments for work in science and technology innovation, correctly grasp the strategic

decisions, deployments, and work requirements set by the CAS party organization, [and] take steps to strengthen our sense of mission, sense of urgency, and sense of crisis....”³⁵²

OCTOBER 2018: XI JINPING CALLS FOR SCIENTIFIC “BREAKTHROUGHS” THROUGH MCF STRATEGY

On October 15, Xi Jinping spoke at the second plenary session of the Central Committee’s Commission on Military-Fusion Development, where he “stressed that [the PLA] must strengthen their shouldering of responsibility, firmly grasp implementation..., promote coordinated innovation of science and technology [with civilian institutions], and accelerate the promotion of deep military-civil fusion development.”³⁵³ Like Xi’s two speeches delivered earlier in 2018 on March 2 and March 12, the October 15 speech showed how high of a priority Xi placed on the MCF strategy and how much pressure he was putting on the PLA as well as civilian institutions like the CAS to carry out his vision.

Xi’s speech highlighted the need for indigenous innovation and “breakthroughs” in producing “key and core technologies,” themes that would pervade discourse at the WIV throughout 2019. “You must put all your effort into making breakthroughs with key and core technologies, and establishing a foothold in the most complex and most difficult situations,” Xi said, “Achieve breakthroughs soon by using project development as the driving force and the concentrated advantages and strengths of a coordinated attack.”³⁵⁴ Xi saw barriers to military-civilian integration that he wanted torn down quickly: “You must greatly simplify the examination and approval of projects, lower the threshold for admission, and lower the systemic costs to unleash the productive power of society.”³⁵⁵

OCTOBER 2018: WIV BSL-4 LAB DIRECTOR PENS ARTICLE ON NEED FOR BIOSAFETY SYSTEM

On October 26, WIV BSL-4 Laboratory Director Yuan Zhiming and four other CAS researchers submitted an article for publication in a newly established English language journal for which Yuan serves as one of two editors-in-chief. The article was titled “Studies on Developing a Safe-Management Standard System for Chinese Biosafety Laboratories,” and it was published online in February 2019.³⁵⁶ Yuan and company were frank in discussing the pros and cons of the WIV’s research and the need for greater oversight: “The biosafety laboratory is a double-edged sword; it can be used for the benefit of humanity but can also lead to a ‘disaster.’ With increasing numbers of high-

level biosafety laboratories constructed in China, it is urgent to establish and implement standardized management measures for biosafety laboratories.... Furthermore, these standardized management measures should be implemented as soon as possible to ensure the effective operation of biosafety laboratories.”³⁵⁷

Yuan’s team further observed that China’s existing biosafety standards focused mainly on construction requirements, while “only a small fraction are operational method standards,” meaning labs in China lacked detailed instructions for how to operating safely.³⁵⁸ As this report will later document, Yuan’s phrase “double-edged sword” would reemerge when a pair of PLA AMMS and CAS researchers published a piece warning about the “dangers from internal supervision and regulatory holes” related to biosafety, which was released in December 2019 as SARS-CoV-2 was ravaging Wuhan, though not yet publicly acknowledged.³⁵⁹

Yuan is a central figure in the effort to ascertain the origin of SARS-CoV-2, as he is the president of the Wuhan branch of the CAS and the director of the Wuhan National Biosafety Laboratory.³⁶⁰ Yuan also holds a political role in the central government, as he is a member of the Chinese People’s Political Consultative Conference.³⁶¹ Yuan’s 2018 paper appears to be the first time he discussed biosafety risks in an English language publication, but it was not the first time he had expressed such concerns.

In 2016, Yuan joined four other researchers to publish a piece in the Bulletin of the Chinese Academy of Sciences that offered ideas for improving the planning of high-level biosafety containment labs in China. Yuan’s team was frank about laboratories being insufficiently regulated and lacking standardized operational procedures: “The building of management and support systems, the laws, regulations and systems of standards for high-level biosafety laboratories urgently need to be further improved....”³⁶² They noted how these challenges applied to the WIV, particularly its new BSL-4 facility: “Certain problems exist with aspects of the building and management of our country’s system of high-level biosafety laboratories. At present, only one BSL-4 laboratory has been built in the country, and the management and maintenance of its key equipment and the personnel’s mastery of the standardized operating procedures of BSL-4 laboratories are not mature enough.”³⁶³ As will be discussed later in this report, Yuan penned two more articles in May and August 2019 that would be published in fall 2019, reiterating his concerns about risks at his and other laboratories in China.

NOVEMBER 2018: GUANGZHOU CITY GOVERNMENT DISCUSSES “COMMON PROBLEMS” AT LABS

On November 7, He Tieshan, an official with the Guangzhou Municipal Health Inspection Bureau, delivered a presentation on “common problems” found during biosafety inspections of laboratories working with pathogenic microorganisms within his jurisdiction.³⁶⁴ Guangzhou boasts China’s largest manufacturing hub, a major trade port, and ranks as one of its most developed and affluent cities.³⁶⁵ Here are the “common problems” discussed in this report:

- 1) Level 1 and 2 laboratories that have not been registered in accordance with regulations....³⁶⁶
- 2) The entrance to the laboratory does not have biohazard warning signage, or the content of the signage is incomplete, and the exit has no lighted sign for emergency evacuation....³⁶⁷
- 3) [Staff are not] proficient with activating and implementing emergency response plans when sudden accidents occur in laboratories....³⁶⁸
- 4) Incomplete registration information, such as the source of, storage of, and experimental projects involving various bacterial (viral) samples....³⁶⁹
- 5) Lack of a “dual personnel, dual lock” system for refrigerated storage of bacterial (viral) species and positive samples.... [The] drop area does not meet theft prevention requirements....³⁷⁰
- 6) Biosafety cabinets, autoclave machines, and other equipment have not been inspected according to regulations....³⁷¹
- 7) Use of disinfectant products violates regulations: ultraviolet ray disinfectant lamp, disinfectant agents, concentration test cards for disinfectant agents, etc....³⁷²
- 8) Failure to disinfect the area prior to taking care of the disposal of highly dangerous waste such as cultures, samples, and preservation fluid for bacterial and viral strains....³⁷³
- 9) Sub-standard management of the placement of samples after experiments are completed, especially positive samples....³⁷⁴
- 10) Autoclave personnel assuming their post before obtaining a certificate of training....³⁷⁵
- 11) The transfer of medical waste not done promptly, especially harmful waste materials....³⁷⁶

- 12) Laboratory wastewater is directly released into a medical institution's sewage management system....³⁷⁷
- 13) Substandard monitoring of laboratory air and material surface disinfectants....³⁷⁸
- 14) Laboratory personnel do not carry out personal protection measures according to the regulations....³⁷⁹
- 15) Items not related to experiments are stored inside the laboratory, and expired reagents are not removed promptly....³⁸⁰

NOVEMBER 2018: WIV CORONAVIRUS **EXPERT** DELIVERS KEYNOTE ADDRESS IN SHANGHAI

On November 14, Shi Zhengli, director of the WIV's Research Center for Emerging Infectious Diseases and the CAS Key Laboratory of Special Pathogens, gave a keynote address at a conference held at Shanghai Jiaotong University. Shi's remarks focused on bat coronaviruses and cross-species infections. Shi reportedly discussed how she and her team had used recombinant analysis to determine that the immediate progenitor virus of the human SARS-CoV-1 virus could have recombined in nature from three viruses (WIV1, Rs4231, and Rs4081) that her team had collected from a cave in a rural county called Mojiang in Yunnan province.³⁸¹ Shanghai Jiaotong University has been linked to the research efforts of the PLA, including hacking operations carried out by PLA Unit 61398.³⁸² After the outbreak of SARS-CoV-2, the report of Shi's 2018 address was removed from the university's website.

NOVEMBER 2018: CHINESE **SCIENTIST** **EDITS GENES** OF HUMAN EMBRYOS

On November 25, news broke that a team led by He Jiankui, a professor at the Southern University of Science and Technology in Shenzhen Municipality in Guangdong Province, had been recruiting couples to create the world's first gene-edited babies. The team reportedly planned to remove the gene CCR5, with the intention of rendering the offspring resistant to HIV, smallpox, and cholera. He claimed to have altered embryos for seven couples, resulting in one successful pregnancy and the subsequent birth of twin girls two weeks before his unethical activities were uncovered. On November 29, PRC authorities ordered He Jiankui and his colleagues to immediately cease their research, and by late December, the authorities placed He under house arrest. In December 2019,

a court sentenced He Jiankui to three years in prison and fined him 3 million RMB (US\$475,083).

While He's prison sentence in 2019 was clearly an act of official opprobrium, the CCP's initial response to He's findings was laudatory. On November 26, the People's Daily, the official mouthpiece of the CCP, published a story titled "The World's First Gene-edited Babies Genetically Resistant to AIDS Were Born in China." The piece touted He's research as "a milestone accomplishment China has achieved in the area of gene-editing technologies."³⁸³ The piece was soon removed, as international controversy grew.

It is important to note that He's work enjoyed the financial support of both central and local authorities. He was recruited to the university through Shenzhen's "Talent Peacock Plan" in 2012, and he was selected to the central government's top science talent program, the Thousand Talents Plan. He had also received research grants from the Guangdong Provincial People's Government and the PRC MOST. In 2018, He was nominated for the China Youth Science and Technology Award given by the Central Government and the Chinese Association of Science and Technology.³⁸⁴ An official PRC inquiry into the matter claimed that He raised money on his own and acted without official endorsement, but He's gene editing research involving human babies was reportedly supported financially at multiple levels of the party-state.³⁸⁵ This is unsurprising when one considers how the CCP designated gene editing as a field of particular strategic importance for China to develop.

NOVEMBER 2018: **CONFLICTING ACCOUNTS** OF THE ACCREDITATION OF THE WIV'S BSL-4 LABORATORY

Discrepant dates provided in Chinese language reports and English language reports pertaining to when final accreditation was received for the BSL-4 laboratory at the WIV suggest that operations could have begun before the requisite safety inspections were completed and final certification of the facilities had been received. Two Chinese reports indicate that the construction project of the BSL-4 lab at the WIV "passed its final acceptance inspection" on November 27.³⁸⁶

Claims of much earlier accreditation, however, have appeared in English language reports. Seven WIV researchers, including the director of the BSL-4 lab, published a report in an online journal run by the U.S. Centers for Disease Control and Prevention claiming that "[a]fter 2 years of testing and commissioning, Wuhan BSL-4 laboratory

passed a series of assessments, and the China National Accreditation Service for Conformity Assessment certified it as meeting the highest biosafety standard in January 2017,” and that “[i]n August 2017, the National Health Commission (NHC) of China approved research activities involving Ebola, Nipah, and Crimean-Congo hemorrhagic fever viruses at the Wuhan BSL-4 laboratory.”³⁸⁷ In January 2018, WIV researchers told U.S. diplomats that the BSL-4 lab was accredited in February 2017, and that WIV leadership considered the lab “operational and ready for research of class-four pathogens (P4), among which are the most virulent viruses that pose a high risk of aerosolized person-to-person transmission.”³⁸⁸

DECEMBER 2018: WIV’S NEW BSL-4 LAB COMPLEX UNDERGOES ANNUAL BIOSAFETY INSPECTION

On December 4, the Biosafety Committee of the WIV carried out the 2018 annual biosafety inspection of the Wuhan National Biosafety Laboratory, its BSL-4 facility. The purpose of the inspection was “to further strengthen and standardize laboratory biosafety management, audit laboratory management system documents and related biosafety risk assessment reports, and prevent biosafety accidents.”³⁸⁹ The meeting began by listening to a summary report on the laboratory’s operations in 2018, and thereafter “each member of the biosafety committee, in accordance with the content of the audit checklist, conducted on-site inspections and audited documents on the four aspects of laboratory biosafety management, biosecurity management, management of scientific research activities, and the management of the facilities and equipment operation and maintenance....”³⁹⁰ The report’s references to “countermeasures” and “rectification plans” suggested that problems were identified during the inspection: “The committee members and experts proactively spoke up, collectively planned countermeasures, and expressed their views and raised rectification plans.”³⁹¹

The director of the biosafety committee was Shi Zhengli, the WIV’s coronavirus expert and director of its Research Center for Emerging Infectious Diseases. Shi presided over the meeting to review the results of the inspection.³⁹² Shi’s comments also painted a picture of a work in progress:

Shi Zhengli concluded by pointing out that biosafety is no trivial matter and is closely related to the personal safety of laboratory personnel. She emphasized that all departments and staff must implement relevant systems and plans where

it really counts and must certainly do a good job with writing relevant summaries and records; at the same time, they must strengthen safety supervision, actively organize trainings and study sessions, strengthen biosafety awareness, and go the next step to formulate and improve the laboratory biosafety management system to propel the laboratory biosecurity system to a higher level.³⁹³

DECEMBER 2018: WUHAN BRANCH OF CAS ECHOES WIV ON “STRANGLEHOLD” PROBLEM

On December 24, the Wuhan branch of the CAS held an end-of-the-year meeting in which the work of 2018 was recapped and general goals for 2019 were discussed. Echoing the September 10 and 14 reports from the WIV, a senior CCP leader at the branch told its management to “focus on the major science and technology tasks to meet the current urgent needs of the nation and the strategic needs for its long-term development, [and] focus on the ‘stranglehold’ problem of key and core technologies....”³⁹⁴

DECEMBER 2018: DEADLY LABORATORY EXPLOSION AT UNIVERSITY IN BEIJING

On December 26, an explosion occurred in a laboratory at Beijing Jiaotong University, a well-regarded research university, and produced a fire that burned three students to death.³⁹⁵ A subsequent investigation found that the explosion was caused by mixing magnesium powder with phosphoric acid, which ignited a large fire. The investigation characterized the experiment as a “risky endeavor” that was conducted in violation of university regulations as well as national regulations and laws pertaining to the procurement and storage of dangerous chemical products.³⁹⁶

THE CHRONOLOGY: 2019

JANUARY 2019: WIV TEAM WINS STATE FUNDING TO STUDY BAT SARS-RELATED CORONAVIRUSES

On January 8, the MOST posted on its website a brief summary of 37 research projects in the natural sciences that had been selected for funding awards in 2018.³⁹⁷ Among the projects that received MOST recognition and funding was a study involving five researchers at the WIV, led by coronavirus expert Shi Zhengli, which examined “research on Chinese bats that carry important viruses.”³⁹⁸ No further details of the project were provided aside from the project number and institution of affiliation.³⁹⁹ We know,

however, that Shi's study won the State Natural Science Award (Second-Class) for 2018, and she and other prize winners were honored at a ceremony in Beijing attended by General Secretary Xi Jinping and Premier Li Keqiang on January 8.⁴⁰⁰

WIV coronavirus researcher Hu Ben also reportedly received funding in 2018 from the Youth Science Fund Project of the state-funded Natural National Science Foundation of China (NNSFC) to conduct a study starting in January 2019 that would examine the "pathogenicity of two new bat SARS-related CoVs to transgenic mice expressing human ACE2."⁴⁰¹ Hu's study was slated to conclude in December 2021, but no findings have been published to date, and references to the study have been removed from the NNSFC website since the spring of 2020.⁴⁰² SARS-CoV-2 is a beta-coronavirus that binds to the human ACE2 receptor with greater affinity than SARS-CoV-1, and thus could have been within the scope of the work that Hu conducted. According to a Chinese medical science database, another relevant study was being conducted by WIV graduate student Hu Bingjie under the tutelage of Shi Zhengli. It was approved for funding in 2017, commenced in 2018, and was expected to run through December 2021. That study was titled "Study of the Evolutionary Mechanism of Bat SARS-like Coronaviruses' Adaptation to Host Receptor Molecules and the Risk of Cross-Species Infection."⁴⁰³ Our attempts to locate a publication containing the results of this study were unsuccessful. Experts in the field who we consulted agreed that it does not appear that the findings have been published.

The significance of these reports is to show that the WIV's research was broadly funded by the PRC central authorities and had even received honors from them, and that in 2019, the WIV was actively working on at least two projects involving undisclosed SARS-related bat coronaviruses that they were artificially adapting to infect human cells. The WIV, as a local research center of the state-run CAS, answers to and receives regular funding from the State Council, but it also received funding for specific projects related to bat coronaviruses from central government agencies in advance of the outbreak of COVID-19. For this and other reasons, it would be difficult for the central leadership in Beijing to distance itself from a serious research-related incident at the WIV, were such an incident to occur.

JANUARY 2019: MINISTRY OF EDUCATION ISSUES DIRECTIVE ON LAB SAFETY AT UNIVERSITIES

The response by the PRC authorities to the laboratory explosion at Beijing Jiaotong University in December 2018 was swift and broadly targeted at university laboratories throughout China, rather than limited to the institution where the incident occurred, suggesting that the authorities did not regard the incident as an isolated case of a breakdown in biosafety standards, but rather saw it as the result of a more widespread problem of laxity. On January 10, the General Office of the Ministry of Education issued a “Circular Regarding Going a Step Further to Strengthen Safety Inspection Work for Teaching Laboratories at Institutions of Higher Learning,” its first directive of 2019.⁴⁰⁴ The directive required all universities to “strictly investigate” the following five issues: 1) setting up and operating a system of laboratory safety management, 2) laboratory safety education for faculty and students, 3) setting up and operating a system for identifying the source of laboratory dangers and managing them, 4) establishing a system to ensure the safety of laboratory facilities and equipment, and 5) developing emergency response capabilities for laboratory safety incidents.⁴⁰⁵

JANUARY 2019: XI JINPING DISPLAYS **UNEASE** WITH INTERNAL SECURITY APPARATUS

On January 15, Xi Jinping gave a speech to the CCP Central Political and Legal Commission’s Work Conference, in which he called on internal security officials to, among other things, “uphold the Party’s absolute leadership of political and legal work,”⁴⁰⁶ and “fulfill your professional duties to safeguard the political security of the state, [and] ensure the overall stability of society....”⁴⁰⁷ Xi further pointed out that internal security officials must “have a clear cut stand that places political construction above all else, diligently forging a high-quality, political-legal corps that puts the Party Central Committee’s mind at ease....”⁴⁰⁸ This could be done, he advised, by “accomplishing the Two Upholds [and] vowing to adhere to the cause of becoming builders and defenders of socialism with Chinese characteristics,” stating that “political and legal organs must dare to turn the blade inward, dare to scrape the poison off the bone, dare to eliminate the black sheep who harm the herd.”⁴⁰⁹ The “Two Upholds” refer to upholding Xi as the core leader of the CCP and upholding the absolute authority of the CCP Central Committee.⁴¹⁰

JANUARY 2019: XI JINPING HIGHLIGHTS LABS, BIOTECH IN CONTEXT OF **“BLACK SWAN”** INCIDENTS

Xi Jinping opened 2019 with an expression of concern about unexpected “major risks” related to biotechnology, among other issues. On January 21, Xi gave a speech to the CCP Central Party School, the theme of which was “adhering to the bottom line in [our] thinking and focusing strictly on guarding against and neutralizing major risks.”⁴¹¹ Many senior CCP, government, and military officials attended Xi’s speech, including members of the Politburo of the CCP Central Committee and the Central Military Commission, as well as numerous senior provincial and ministerial-level officials.⁴¹² According to the New York Times, the meeting was called abruptly and Xi’s speech conveyed an “anxious urgency.”⁴¹³ While many media outlets interpreted Xi’s speech as largely focused on external threats and economic risks, one scholar of Chinese politics noted that Xi’s concerns were much more expansive, spanning both international and domestic issues as well as matters of political and economic importance.⁴¹⁴ The People’s Daily, the CCP’s official mouthpiece, summarized Xi’s comments thusly:

In his speech, Xi Jinping made an in-depth analysis and put forward clear requirements on preventing and neutralizing major risks in the areas of politics, ideology, the economy, science and technology, society, the external environment, and party building. He emphasized that in the face of a turbulent international situation, the complicated and sensitive environment along [China’s] periphery, and the arduous and onerous duties of reform, development, and stability, we must maintain a high level of vigilance from the beginning to the end. We must be both highly vigilant about “black swan” incidents and also guard against “gray rhino” incidents. We must not only go on the offensive to prevent risks, but we must also have masterful strategies to deal with and resolve risks and challenges; we must fight a well-prepared battle to prevent and stand against risks, but also to wage a proactive war to turn dangers into safety and transform crisis into opportunities.⁴¹⁵

According to a study manual for CCP cadres, a “‘black swan’ incident refers to a major incident that is very rare, unpredictable, but [that] as soon as it occurs,...trumps any and all prior experiences,” while a “‘grey rhino’ incident refers to an incident in which the problem is great, and there were early signs, but it was not given sufficient attention, and led to severe consequences as a result.”⁴¹⁶ As illustrated in the People’s Daily quote above, the seven areas that Xi believed could present “major risks,” and potentially give

rise to “black swan incidents” and “grey rhino incidents,” were very broad in scope, and “science and technology” were included among them.

The January 21 speech was not the first instance of Xi using the terms “black swan” and “grey rhino.”⁴¹⁷ It does, however, appear to be the first time that Xi had used these two terms to describe potential problems pertaining to science and technology. Among the specific topics that Xi pointed to as in need of greater attention were the “state key laboratories,” which are state-funded and largely administered by the state.⁴¹⁸ While Xi’s comments were general in nature, and China has hundreds of state key laboratories,⁴¹⁹ we note that the WIV has hosted state key laboratories since 2005, including the CAS Key Laboratory of Special Pathogens, which is part of the WIV Center for Emerging Infectious Diseases led by coronavirus expert Shi Zhengli.⁴²⁰

The People’s Daily summarized Xi’s remarks on science and technology as follows:

Xi Jinping emphasized that security in the field of science and technology is an important component of national security. It is necessary to strengthen system building and capacity building, improve the national innovation system, solve prominent problems such as the duplication of resource allocation, the fragmentation of scientific research capabilities, and the unclear orientation [in terms of] the purpose and lines of innovation, and raise the overall effectiveness of the innovation system. It is necessary to speed up [the process] of addressing these shortcomings and establishing the advantages of independent innovation systems and mechanisms. It is necessary to strengthen strategic research and assessment and forward-looking deployment in major areas of innovation, paying special attention to the strategic positioning of state laboratories, reorganizing the state system of key laboratories, building major bases and platforms for innovation, and improving collaborative mechanisms for innovation between industry, academia, and research institutions. It is necessary to strengthen the overall planning and organization of major scientific and technological duties related to national security and economic and social development, and strengthen efforts to build national strategic scientific and technological capabilities. It is necessary to speed up the establishment of an early warning and monitoring system for scientific and technological safety and accelerate relevant legislative

work in areas such as artificial intelligence, gene editing, medical diagnosis, autonomous driving, drones, and service robots.⁴²¹

The point here is not to suggest that a link exists between Xi's speech and a biocontainment failure in Wuhan; January was several months before the earliest estimated dates of the emergence of SARS-CoV-2. Rather it is simply to highlight that Xi saw biosafety and biosecurity as components of national security and potential sources of unexpected and highly consequential "black swan" and "grey rhino" incidents. Xi further perceived a need for an early warning and monitoring system specifically for safety matters pertaining to science and technology. It is perhaps significant that in late July, just over six months after Xi's speech, the CCP secretary at the WIV held a study session that stressed the importance of Xi's remarks on "black swan" and "grey rhino" incidents.⁴²²

JANUARY 2019: WIV TELLS FRENCH OFFICIALS ABOUT SHORTAGE OF POSITIVE PRESSURE SUITS

On January 24, three officials from the Consulate General of France in Wuhan and the Embassy of France in Beijing visited the WIV and met with WIV Deputy Director Gong Peng, Director of the Wuhan BSL-4 Laboratory Yuan Zhiming, and BSL-4 Lab Deputy Directors Shi Zhengli and Song Donglin.⁴²³ A fourth Frenchman named Rene Courcol, identified as a "laboratory quality control specialist," also briefed the visitors and joined them for a tour of the facilities.⁴²⁴ The French government sent Courcol, a microbiologist from Lille University Hospital, to Wuhan in May 2018 to assess the quality of the WIV's work and safety procedures. While the PRC authorities had initially agreed to allow as many as 50 French researchers to conduct experiments at the new BSL-4 laboratory that France helped to build, Courcol was the only one to ever step foot inside the facility.⁴²⁵

The WIV report described Courcol as having delivered a presentation on the establishment of the WIV's quality control system as well as a comparative study of the procedural documents for laboratories in France and China. No further details were disclosed. It indicated that "the two sides also exchanged views and held an in-depth discussion on the organization of a new term of the guiding committee, pathogen resource sharing between China and France, and the export of positive pressure protective suits for P4 laboratories."⁴²⁶ It characterized the French officials as having said they would "actively facilitate exchanges and assist the Wuhan P4 lab in resolving

its shortage of positive pressure protective suits and other problems.”⁴²⁷ It is worth noting that what the WIV report called the “guiding committee” appeared to be a reference to the defunct Franco-Chinese Committee on Infectious Diseases, which stopped meeting in 2016 after its French cochair resigned in frustration over Beijing having reneged on its promises regarding the French role at the WIV.⁴²⁸

For more information on the fraught relationship between the WIV and France, see “Were the WIV’s Biosafety Lapses the Inevitable Fallout from Expelling the French?” in the background section that precedes the chronology.

FEBRUARY 2019: CHINESE EXPERTS HIGHLIGHT BIOTECH RISKS

On February 20, the first two of at least four notable publications in 2019 by prominent Chinese experts pointing to the potential biosafety and biosecurity risks of synthetic biology appeared online. In the first issue of the inaugural volume of the Journal of Biosafety and Biosecurity, which is managed by Director of the Wuhan National Biosafety Laboratory Yuan Zhiming, two microbiologists from Tianjin Municipality wrote: “One important biosafety concern in synthetic biology is the intentional or unintentional release of synthetic organisms into the environment during research and application....”⁴²⁹ Echoing Xi Jinping’s speech in January, the two authors went on to explain the dangers associated with genomic editing: “The emergence of CRISPR/Cas9, a new genome-editing technology, has had tremendous effects on the synthetic-biology field. This technology not only improves the accuracy and efficiency of editing of pathogens’, animals’, plants’, and human genomes, but also yields traceless modification of genomes in a short period. Therefore, the technology can be utilized to enhance the pathogenicity, virulence, or transmission of toxins or bacteria....”⁴³⁰

On February 20, a piece written in the same journal by four researchers from the PLA AMMS emphasized that infection through aerosols, which is the chief mechanism of infection for SARS-CoV-2, posed the greatest risk for laboratory-acquired infections when working with viral pathogens. The authors wrote:

The experimental activities in the biosafety laboratory mainly involve sample collection, transportation, receiving, processing, experimental operation and preservation, waste disposal, etc. For each activity, there is a risk that if control methods are improper, pathogens can infect the experimental staff or spread outside the laboratory to infect people in society. The reasons for biosafety

laboratory infections mainly include cuts, acupuncture, direct exposure of skin, mucosa, and eyes to infectious microorganisms, animal bites, inhalation of infectious aerosols, etc. Among them, aerosol infection is the most common, because aerosols are ubiquitous during experiments and are difficult to detect. Laboratory workers at high risk during testing are the key target for prevention of infections in biosafety laboratories.... Studies have shown that there are risks of aerosol exposure in a variety of experimental operations, including high concentration of suction and mixing, ultrasonic lysis, accidental dropping of high-concentration culture bottles, rupture of centrifuge tubes, accidental spillage of freeze-dried powder, accidental squirting when injecting an animal, and animal dissection, etc.⁴³¹

The authors' recognition of the high risk of infection through aerosols in a laboratory setting was a logical implication to draw from the PRC's previously expressed understanding that aerosol delivery of pathogens would be the vehicle of choice for the targeted release of biological agents in modern warfare. For example, in its 2011 submission to the BWC, the PRC Ministry of Foreign Affairs included a subsection on "targeted drug-delivery technology making it easier to spread pathogens" that stated:

Aerosol technology can be used effectively to spread pathogenic microbes, infecting humans through the respiratory tract. And viral vectors can very easily carry special genes into the body, thereby causing damage. Further, there is potential for the effects of aerosol delivery, specifically targeted viral vectors, transfection, and gene expression to combine, greatly increasing the overall effect. Both technologies can be used by certain States and terrorist groups for malicious purposes, efficiently spreading pathogens and disease-causing genes.⁴³²

FEBRUARY 2019: BSL-3 LAB AT WIV'S NEW CAMPUS RECEIVES ACCREDITATION CERTIFICATE

On February 21, the WIV reported that in "recent days" the BSL-3 laboratory that is co-located with and supports the work of the BSL-4 laboratory at the Zhengdian campus had received a certificate of accreditation from the China National Accreditation Service for Conformity Assessment (CNAS).⁴³³ The report indicated that unspecified "non-conforming items" were found during on-site inspections conducted by CNAS in

September 2018 that CNAS required the WIV to address before the BSL-3 laboratory could be certified:

From September 25-28, 2018, CNAS organized experts to conduct the preliminary assessment of the laboratory qualifications of the P3 laboratory. After two and a half days of comprehensive assessment and testing, a thorough document review, on-site inspections of the facility and its personnel, the assessment team unanimously agreed that the hardware facilities of the laboratory satisfied the protection requirements for level-three pathogens. At the same time, specific rectification requirements were put forward regarding non-conforming items that were discovered during the inspection process and [other] observations. With the combined efforts of all of the laboratory staff, all the rectification work was completed by the end of November, and [the laboratory] passed the on-site reexamination on December 1, and finally obtained the CNAS accreditation certificate [in February 2019].⁴³⁴

MARCH 2019: SERIES OF WIV REPAIRS AND RENOVATIONS BEGIN

The WIV submitted several costly procurement requests for major renovation and maintenance projects involving their relatively new BSL-3 and BSL-4 laboratory facilities during the course of 2019, the first two of which were filed in March, according to documents obtained from a Chinese government procurement website. On March 1, the WIV issued a procurement notice seeking contractors to bid on an unspecified maintenance project at a BSL-3 laboratory and the laboratory animal center at the new Zhengdian Park campus, with a budget of approximately US\$38,847 (RMB 260,000).⁴³⁵ This procurement notice, which suggested that the BSL-3 laboratory would soon undergo maintenance, surfaced less than two weeks after the WIV reported that the same laboratory had just received an accreditation certificate after “non-conforming items” had been addressed in late 2018.

On March 21, the WIV issued another procurement notice seeking to purchase 20 positive pressure protective suits, for which it allotted a budget of approximately US\$216,647 (RMB 1.45 million).⁴³⁶ In 2016, the French Dual-Use Commission reportedly declined a WIV request to purchase additional containment suits because the volume was “well above the needs of the Wuhan [lab],” and fueled French concerns that the WIV was engaged in undisclosed military research.⁴³⁷

MARCH 2019: STATE COUNCIL PASSES REGULATIONS ON GENETIC MATERIALS

On March 20, the State Council revised the “PRC Human Hereditary Resources Management Regulations,” updating and replacing provisional measures that were put into effect in 1998.⁴³⁸ The regulations significantly strengthened the state review process for research projects conducted with international institutions or individuals that involved the use of genetic material from Chinese people. They also sought to clarify and further standardize procedures for the use of genetic material in domestic R&D as a matter of “public health, state security, and the public interest.”⁴³⁹ As noted earlier in the background section, PLA strategists have called to restrict foreign access to Chinese genetic material and for more domestic research to map out the Chinese genome to determine any unique genetic vulnerabilities that could be exploited by an adversary developing a biological agent, and conversely, to advance their own understanding of biological agents that would affect other races but not Chinese.⁴⁴⁰ Premier Li Keqiang signed the regulations on May 28, and Xinhua publicized the regulatory change on June 10. They took effect less than a month later on July 1.⁴⁴¹

MARCH 2019: CUSTOMS INCREASES BIOSECURITY MEASURES AT PORTS OF ENTRY

On March 24, Zhang Jiwen, the Director of the PRC State Customs Administration, spoke to a national meeting of customs officials and drew their attention to the importance of carrying out instructions from Xi Jinping regarding biosecurity at ports of entry. Zhang said, “[P]ersisting with the implementation of the spirit of General Secretary Xi Jinping’s various important oral and written instructions, and in accordance with the deployment requirements of the National Customs Work Conference, [we must] use the strictest measures in an all-out effort to ensure the biosecurity of the nation’s gates, and to firmly construct an epidemic inspection line of defense at our ports of entry....”⁴⁴² A series of safety drills and table top exercises, primarily held at airports, would be carried out in various cities around China subsequent to Zhang’s speech, and some of them cited Xi’s instructions as the impetus for the drills. These safety drills will be detailed later in this report.

MARCH 2019: GEORGE GAO SHARES CONCERNS ABOUT BIOTECH RISKS

On March 25, George Fu Gao, the director-general of the CDCP, published an article online in the journal Biosafety and Health, which is jointly run by the CDCP and the

Chinese Medical Association.⁴⁴³ Gao also holds a professorship in the Institute of Microbiology at the CAS, and is president of the Chinese Society of Biotechnology.⁴⁴⁴ Like the two microbiologists from Tianjin writing in February 2019, Gao's commentary warned about the inherent risks of genomic editing and synthetic biotech:

Advances in biomedical technologies, such as genome editing and synthetic biotechnology, have the potential to provide new avenues for biological intervention in human diseases. These advances may also have a positive impact by allowing us to address risks in new approaches. However, the proliferation of such technologies means they will also be available to the ambitious, careless, inept, and outright malcontents, who may misuse them in ways that endanger our safety. For example, while CRISPR-related techniques provide revolutionary solutions for targeted cellular genome editing, it can also lead to unexpected off-target mutations within genomes or the possibility of gene drive initiation in humans, animals, insects, and plants. Similarly, genetic modification of pathogens, which may expand host range as well as increase transmission and virulence, may result in new risks for epidemics. For example, in 2013, several groups showed that influenza H5N1 viruses with a few nucleotide mutations and H7N9 isolates reassorted with 2009 pandemic H1N1 virus could have the ability for airborne transmission between ferrets. Likewise, synthetic bat-origin SARS-like coronaviruses acquired an increased capability to infect human cells. Thus, modifying the genomes of animals (including humans), plants, and microbes (including pathogens) must be highly regulated.⁴⁴⁵

Gao's views are consistent with previous PRC official statements on the weaponization of synthetic biology. For example, in its 2011 submission to the BWC, the PRC Ministry of Foreign Affairs included a subsection on "synthetic biology enabling the creation of man-made pathogens" – a reference to the gain-of-function research conducted at the WIV and other laboratories that had emerged as a cause of controversy in the scientific community worldwide. The submission stated such research had "the potential to be used for evil ends," because it "could be used in the future to create pathogens of even greater toxicity and infectiousness than those currently known...."⁴⁴⁶ It went on to describe how "microbial genomic research can enhance the virulence or pathogenicity of a pathogen by modifying its antigenic properties,"⁴⁴⁷ further noting: "[T]he sequencing of pathogen DNA has helped develop new drugs and vaccines. But the same data can

also be used to synthesize new pathogens and modify pathogen antigenicity, infection specificity, toxicity, and resistance to drugs, causing traditional means of dealing with infectious disease to fail and rendering the prevention and control of such disease even harder.”⁴⁴⁸

MARCH 2019: NPC DECIDES BIOSECURITY LAW IS A PRIORITY FOR 2019

On March 26-27, the NPC had a meeting to discuss its legislative agenda for the upcoming year, where it was decided that a biosecurity bill would be designated a top priority, and placed on an accelerated course for drafting, review, and passage, with the first reading to be completed in 2019.⁴⁴⁹ An analyst of the NPC noted that while the biosecurity bill was included in the NPC Standing Committee’s 13th Legislative Plan approved in September 2018, the bill was categorized among the lower-priority projects, and it appeared that CCP leadership only decided it would be a higher priority in 2019, perhaps in response to the November 2018 CRISPR-baby scandal.⁴⁵⁰

The March report did not specify the reason why the biosecurity law went from a low to high priority in less than six months, but it implied that the decision was connected to “some biosafety incidents in our country reported by the media in recent years that aroused a high-level of international and domestic attention.”⁴⁵¹ Just a month earlier on February 25, Xi Jinping called for the NPC “to use legislation to ensure high-quality development and accelerate the economy’s sustainable and healthy development,” and the biosecurity bill was among the items Xi singled out in this regard.⁴⁵² Xi’s comments likely spurred the NPC’s reprioritization of its legislative agenda.

APRIL 2019: WIV HOLDS ANNUAL MEETING ON BIOSAFETY AND BIOSECURITY WORK

On April 3, the WIV held its annual work conference on lab security and safety.⁴⁵³ Comments from its leadership suggested some concern about laxity and emphasized the importance of biosafety measures in advance of key political anniversaries in 2019. He Changcai, the deputy secretary of the CCP committee at the WIV, pointed out:

This year is the 70th anniversary of the founding of a new China and the 70th anniversary of the founding of CAS.... Doing a good job with our work [to maintain] safe production is extremely important. We must start by speaking from the high point of politics to understand safe production. We must firmly

establish the concept of safe development, treat safe production from the perspective of practicing the “Two Upholds”..., at all times tighten the string of safe production and sound the alarm bells, always grasp unrelentingly, and strive to create a good environment for scientific and technological development.⁴⁵⁴

He’s comments came just two days after CCP leaders at the Wuhan CAS held a meeting with WIV personnel to brief them on an “extremely accurate and detailed report” of the problems uncovered during a recent “political inspection tour” of the lab, suggesting heightened political scrutiny of the lab.⁴⁵⁵

He Changcai further clarified that WIV researchers were accountable to both the CCP and the government, and that both the technical experts serving as officials at the WIV in a state capacity and CCP officials at the WIV would be held responsible for the WIV’s work:

He emphasized the strict implementation of the requirements of the safety management responsibility system to “be responsible to the party and government, a single post has dual responsibilities [to the party and government], joint control and shared management [between the party and government], [and] the holding of those accountable for dereliction of duties,” and to insist on the “imperative to manage safety while managing professional work, and the imperative to manage safety while managing production,” it is imperative that both aspects of the work advance side by side.⁴⁵⁶

He called on WIV managers to “strictly abide by the system of various national laws as well as the rules and regulations of the CAS and the WIV on safety management, strengthen day-to-day safety management, and at unscheduled times, launch self-inspections of safety [conditions] and rectification of hidden dangers....”⁴⁵⁷

Wang Yanyi, the director of the WIV, also delivered remarks, opening with the assertion that “the safety work of the institute is the precondition and guarantee for succeeding at all of the other work at the institute.”⁴⁵⁸ Wang continued with He’s theme of holding researchers accountable for safety incidents: “She demanded 1) the strict implementation of the safety work responsibility system, tightly integrating safety management work with the professional work of research and development, reaching the point where the two are ‘planned together, deployed together, inspected together,

summarized together, and evaluated together’; 2) all operations inside the laboratory must be carried out in strict adherence to professional standards and procedures with no tolerance for any kind of wishful thinking; 3) take steps to strengthen safety management for students.”⁴⁵⁹

Wang Yanyi closed with the following admonition: “Safety work is no trivial matter. You must at all times tighten the string of safe production, reaching the point that no regulation and no action has been overlooked. When you discover problems, promptly rectify them in a satisfactory manner.”⁴⁶⁰ While the aforementioned WIV report was dated April 8, 2019, the webpage URL and the time stamp from Google search results both indicated that the report was not posted until November 11, 2019, which as we will document later in this report, was concurrent with when the WIV was dealing with the fallout of what appears to have been a major biosafety incident.

APRIL 2019: WIV SIGNS JOINT RESEARCH AGREEMENT WITH JINYINTAN HOSPITAL

On April 23, the WIV and the Wuhan Municipal Jinyintan Hospital signed a research cooperation agreement.⁴⁶¹ WIV Director Wang Yanyi and Wuhan Jinyintan Hospital Director Zhang Dingyu attended the signing ceremony along with other leaders from both sides. During the ceremony, Zhang said the hospital was undergoing a phase of rapid development and expressed hope that it could start cooperation with the WIV in the areas of hand, foot, and mouth disease, HIV/AIDS, influenza and upper respiratory infectious diseases, and tuberculosis. The goal, as Zhang explained it, was to facilitate the integration of basic research, translational medicine, and clinical practice, and to enhance the scientific research capacity of both the WIV and the Jinyintan Hospital. The research cooperation agreement would help build a national-level technical platform for clinical trials, according to Wang Yanyi, and contribute to the nation’s public health infrastructure by building capacity to respond to infectious diseases.⁴⁶² It is worth noting that the first confirmed cases of COVID-19 – at least the earliest that the authorities have disclosed – were diagnosed in patients treated at Jinyintan Hospital.⁴⁶³

April 2019: Deputy Director of CAS Leads Safety and Security Inspection at the WIV

On April 28, Wang Shuzhi, deputy director of the General Office of the CAS in Beijing, led a group of experts to “investigate and study” the WIV’s safety and security work. The group carried out “on-the-spot” inspections of the WIV’s water and electricity consumption, fire protection and anti-theft measures, its storage of hazardous chemicals,

and its sorting and classification of biowaste.⁴⁶⁴ At a meeting held after the inspection, a report was delivered on the WIV's safety and security work, and the participants engaged in a focused discussion on "the plan for upgrading the security facilities of the Zhengdian Scientific Research Park."⁴⁶⁵

The report stated that Wang "affirmed the effectiveness of the WIV's security work and put forward suggestions to improve the [facilities] upgrade plan." Another comment, however, suggested that Wang did not judge the WIV's safety and security measures to be sufficiently systematized: "He required that the WIV establish a sound security management system, [and] improve the mechanisms of its security work..."⁴⁶⁶ Wang did not explain why it was that a facility billed as state-of-the-art, which had only recently begun operations, was already in need of an "upgrade plan." It was also not clear if the aforementioned procurement notices for lab maintenance on March 1 and the purchase of positive pressure suits on March 21 were part of that "upgrade plan."

APRIL 2019: WIV TELLS YOUNG RESEARCHERS TO BE A FORCE THAT THE CCP CAN TRUST

On April 29, the WIV held a special training for young researchers on "Xi Jinping Thought on Socialism with Chinese Characteristics in the New Era." More than 80 junior staff, both CCP members and non-members alike, attended the training.⁴⁶⁷ Li Li, the deputy director of the Office of the WIV CCP Committee, called Xi's thought a "sharp ideological weapon" to cut through various difficulties, and urged the young researchers to "launch research and development work [and] become the courageous fighters of this era under the leadership of the party, standing squarely on the demands of the state."⁴⁶⁸ He Changcai, the deputy secretary of the CCP committee, also told the young researchers: "CAS, as a national strategic science and technology force that the Party, the state, and the people can rely on and trust, bears the weight of the mission to build our country into a global power in science and technology. For the young people of the CAS, you were born at an opportune time, but a heavy responsibility also rests on your shoulders."⁴⁶⁹

MAY 2019: NHC HOLDS WORK CONFERENCE ON "SAFE PRODUCTION"

On May 8, the NHC held a virtual work conference by video teleconference with health officials from all around China.⁴⁷⁰ The conference emphasized the sense of responsibility and urgency that officials should feel when implementing safety measures, particularly

to “ensure that no major safety or security accidents occur” and maintain stability in the lead up to the 70th anniversary of the founding of the PRC in October 2019.⁴⁷¹ Among the directives given by NHC to local officials was the following warning about laboratories: “Do a good job with supervising and regulating high-level biosafety experimental activities and managing high-grade cultures of pathogenic microorganisms.”⁴⁷²

MAY 2019: WIV HOLDS MANDATORY STATE SECRETS TRAINING FOR RESEARCHERS

On May 10, Xiao Gengfu, the CCP party secretary at the WIV, required all of the WIV’s professional research personnel, postdoc researchers, and graduate students to attend a training session on the protection of state secrets, and sign pledges to protect classified information pertaining to their research at the WIV.⁴⁷³ Tang Kaihong, a local official from China’s National Administration for the Protection of State Secrets, discussed the national security risks involved with the institute’s research and warned of infiltration efforts by foreign spies, according to an account published by the WIV’s parent organization, the CAS.⁴⁷⁴ The WIV also published its own report about the training, but while the WIV report was dated May 13, 2019, the webpage URL and the time stamp from Google search results both indicated that the report was not posted until November 11, 2019, which as we will document later in this report, was concurrent with when the WIV appeared to be dealing with the fallout from a major biosafety incident.⁴⁷⁵

Tang Kaihong’s reported comments shed light on the state-run nature of the WIV and the CCP’s goal to prevent the outside world from knowing the details of the WIV’s work. Tang “raised detailed preventive measures to address the hidden dangers of using mobile phones,”⁴⁷⁶ and said:

[A]s our country’s comprehensive national power has continuously increased, with the speedy development of informatization, and the continued advancement of big data, cloud computing, artificial intelligence, and other technologies, external espionage and intelligence organizations are increasingly active in targeting our country through intelligence infiltration, [and] the situation for protecting security secrets is increasingly complex and grim. Therefore, we must securely establish the “holistic view of national security,” take steps to strengthen awareness of [the need to] protect and prevent security secrets [from vulnerabilities] on the Internet, mobile phones, and in other emerging areas, [and]

master the basic knowledge and technical skills in order to improve our ability to protect security secrets, counter traitors, and prevent spies.⁴⁷⁷

The importance of protecting state secrets also featured as a key subject of a “national security education” meeting held for CCP members at the WIV on April 26, 2019, as well as at the basic training that the new class of graduate students at the WIV received on September 3, 2019.⁴⁷⁸

MAY 2019: DIRECTOR OF BSL-4 LAB DRAFTS SECOND ENGLISH PAPER ON BIOSAFETY ISSUES

On May 15, Yuan Zhiming, the director of the Wuhan National Biosafety Laboratory, submitted an article for publication in the newly established English language Journal of Biosafety and Biosecurity, for which Yuan serves as one of two editors-in-chief.⁴⁷⁹ The paper was titled “Current Status and Future Challenges of High-Level Biosafety Laboratories in China.” Yuan discussed concerns about biocontainment labs in China, including the WIV, ranging from neglected maintenance costs and insufficient operational funds to a lack of specialized managers and engineers to operate the labs.⁴⁸⁰ Yuan’s paper also pointed to lax enforcement (“enforcement still needs to be strengthened”) of existing regulations pertaining to pathogen, waste and laboratory animal management, and warned that such uneven implementation “puts biosafety at risk.”⁴⁸¹ Yuan submitted a revised version of the paper on September 10, and it was published online on October 24.⁴⁸² The timing of the paper’s revision and publication corresponded roughly with other significant events at the WIV and nearby, which will be discussed later.

MAY 2019: SECOND HIGHEST OFFICIAL FROM CAS INSPECTS WUHAN’S PARTY BUILDING EFFORTS

From May 27 to 28, Hou Jianguo, then deputy secretary of the CAS Party Organization in Beijing and vice president of the CAS, visited the Wuhan branch of the CAS to investigate its efforts to build the CCP’s organizational presence and its recruitment and cultivation of talented CCP cadres.⁴⁸³ Hou’s visit, along with a slew of subsequent reports, illustrates the high degree of CCP penetration of the CAS and the WIV, and the CCP’s preoccupation with maintaining a political focus on what are ostensibly centers of scientific research. Hou “emphasized that under the guidance of Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era, we must strengthen the ‘Four

[Types] of Consciousness,’ fortify the ‘Four [Types] of Self-Confidence,’ and resolutely achieve the ‘Two Upholds.’” Hou urged the WIV, “Maintain a high degree of consistency with the Party Central Committee with Comrade Xi Jinping at the core in your political stance, political direction, political principles, and political path from the beginning to the end.”⁴⁸⁴ Hou advised the WIV to “strictly avoid formalism and bureaucratic thinking,”⁴⁸⁵ previewing a criticism of lackluster compliance with political edicts that would be levied at the CAS and the WIV later that year.

MAY 2019: PLA HOSPITAL NEAR WUHAN MAKES POLYMERASE CHAIN REACTION EQUIPMENT PURCHASE

On May 27, the PLA Air Force Airborne Corps Hospital located in Xiaogan Municipality, Hubei Province (approximately 37 miles northwest of Wuhan) made a purchase of polymerase chain reaction (PCR) testing equipment (a fluorescent quantitative PCR instrument), according to analysis by an Australian cybersecurity research firm.⁴⁸⁶ The PLA Air Force Airborne Corps Hospital also took control of medical supply logistics in Wuhan during the height of the coronavirus outbreak in early February 2020, dispatching a team of 260 officers and 130 military trucks.⁴⁸⁷ The PLA’s purchase of PCR testing equipment in May 2019 was the first of a series of purchases from mostly state-run institutions in Hubei province to be documented. All in all, spending on PCR equipment in Hubei province jumped from 36.7 million RMB in 2018 to 67.36 million RMB in 2019.⁴⁸⁸

JUNE 2019: COMMUNIST PARTY DIRECTS WIV’S OPERATIONS, URGES “LEAPFROG DEVELOPMENT”

On June 10, a CCP official from Hubei Province was sent to the WIV to examine its efforts to expand the party’s presence within the institute. The official’s assessment was laudatory, noting that the WIV had “realized the organic fusion of party building and professional work, and had reached [the standard] of complete coverage and no blind spots in its party building work.”⁴⁸⁹

On June 20, the WIV held the first of three study sessions on Xi Jinping’s admonition to CCP members to “stay true to our original aspiration and keep firmly in mind our mission.” Xiao Gengfu, the secretary of the WIV’s CCP committee, explained what this meant for the WIV: “The Wuhan Institute of Virology, as a research and development institute of the state, our original aspiration and mission is simply to ‘innovate science

and technology, serve the state, [and] create prosperity for the people.’ After going through this study session, we must consciously measure our work against the benchmark of the state’s demands for science and technology innovation work....”⁴⁹⁰ Less than a month later, Xiao reiterated this point: “Those responsible for the research center must fully achieve the effect of setting an example through their work, raising politics to an important place [in their work], keeping firmly in mind the original aspiration of ‘innovating science and technology, serving the state, making the people prosperous’ and the mission of ‘establishing [China] as a world power in science and technology.’”⁴⁹¹

On June 24, the WIV held a second study session on the theme of “staying true to our original aspiration and keeping firmly in mind our mission.”⁴⁹² A senior CCP official noted that “formalistic and bureaucratic ways of doing things are current prominent contradictions and problems inside the party,”⁴⁹³ and called on WIV personnel to address these problems, which essentially refer to superficial conformity with the CCP’s political demands in form, but not in substance.⁴⁹⁴ The same official also alluded to the precariousness of the WIV’s development: “Currently, the work of planning and establishing the Center for Biosafety Mega-Science [at the WIV] is at a critical stage. This not only requires the vast majority of management personnel to continuously raise their outlook, quality, and capabilities to complete the work of shouldering responsibility, leading the troops well, and implementation, but also requires full coordination between each department, [and] from this [we can] do a better job of escorting the convoy of science and technology innovation work.”⁴⁹⁵

On June 27, the CCP branch at the Zhengdian Laboratory Campus of the WIV was selected as a “Red Flag Party Branch,” besting more than 7,000 grassroots party branches that are directly under the supervision of the Hubei Provincial CCP Committee. The Zhengdian Laboratory CCP Branch was commended for its diligent study of Xi Jinping Thought, and for “persisting with the strengthening of minds and molding of souls, exerting themselves to raise the quality of political ideology among party members and cadres..., [and] persisting with the building of a strong combat fortress from the beginning to the end....”⁴⁹⁶

On June 28, the WIV held a general assembly and political study session to celebrate the 98th anniversary of the founding of the CCP. The entire WIV management and more

than 150 of its personnel who are CCP members attended the event.⁴⁹⁷ All participants were required to stand up and publicly “renew the oath that they took when they joined the party,” and 20 of them were recognized as “Excellent Communist Party Members of 2019.”⁴⁹⁸

These five reports, published in less than a month’s time, show that science, like most fields of professional endeavor in China, is thoroughly permeated by CCP political influence and varying degrees of direct control, particularly at state-run research institutions such as the CAS and the WIV. These reports were not isolated, or confined to the month of June, but rather were representative of a steady stream of political discourse at the CAS in general and the WIV in particular. Nine reports of political meetings were published on the WIV website in July 2019 alone,⁴⁹⁹ and four reports in August 2019.⁵⁰⁰

These reports illustrate how the CCP dictates to the CAS the goals to which its research must be oriented and pressures its leadership to deliver results. For example, the CCP official who led the study session above urged WIV personnel to “enthusiastically throw yourselves into the work of CAS [to achieve] the ‘Three Orientations’ and the ‘Four Firsts.’”⁵⁰¹ The “Three Orientations” refer to “orienting toward [reaching] the world’s frontier of science and technology, orienting toward [meeting] the major needs of the state, and orienting toward the major battlefields of the national civilian economy.”⁵⁰² The “Four Firsts” refer to Xi’s edict that the CAS should become a pioneer in four areas to, among other things, achieve leapfrog development in science and technology (see earlier subsection called “Pleasing the Party”). In September 2019, the CCP conducted a political inspection of CAS headquarters in Beijing that produced a number of criticisms of the CAS, including the “persistent gap between the spirit of General Secretary Xi Jinping’s important instructions on the ‘Three Orientations’ and ‘Four Firsts’ and their implementation [at the CAS].”⁵⁰³ Another indicator of the WIV’s status as an extension of the party-state is its involvement in projects related to Xi’s signature Belt and Road Initiative.⁵⁰⁴

JUNE 2019: WIV STILL STRUGGLING WITH “STRANGLEHOLD PROBLEM”

The WIV published three separate reports in June that cited the problem of stranglehold technologies, which would reemerge in a key WIV report in November 2019. On June 10, a visiting CCP official from Hubei province praised the WIV for its efforts to solve

the problem: “To address the ‘stranglehold’ problem of importing key and core equipment that could occur, [your team] organized a specialized working group to carry out technological [efforts] to tackle the problem, and to procure and develop domestically produced substitutes.”⁵⁰⁵ On June 20, WIV CCP Secretary General Xiao Gengfu urged WIV personnel to “focus on the ‘stranglehold’ problem within the realm of biosafety, put forward plans to resolve the problem, and by tackling this thorny problem, overcoming the challenges, and earnestly pushing forward the construction and development of the Center for Biosafety Mega-Science, [we can] help the development of science and technology for the nation.”⁵⁰⁶ On June 27, the Zhengdian Laboratory Party Branch was honored as a “Red Flag Party Branch,” and in the commendation it received, an area in which its success was recognized was having “launched management exchanges and independent research and development centered on the technology stranglehold problem.”⁵⁰⁷

JUNE 2019: WIV FORMS PARTNERSHIP WITH HOSPITAL THAT LED THE FIGHT AGAINST SARS

On June 27, Guan Wuxiang, the deputy director of the WIV, led a delegation of WIV researchers on a visit to Guangdong Province in southern China, where they called on the Guangzhou Municipal No. 8 People’s Hospital, which is known for its central role in combatting the SARS epidemic in 2003-2004. The purpose of the visit was to sign a “strategic cooperation agreement” to jointly combat the outbreak of infectious diseases.”⁵⁰⁸ The report documenting the visit on the WIV website explained:

Emerging and sudden outbreaks of infectious disease and major infectious disease have a bearing upon the health of the people, social stability, and national security, [and] the Wuhan Institute of Virology and the Guangzhou No. 8 People’s Hospital each boast advantages and distinguishing characteristics with regards to basic research and the clinical treatment of infectious diseases. The two parties in the future, taking the signing of the strategic cooperation agreement as a new starting point, will launch comprehensive cooperation and jointly make important contributions to our country’s prevention and control efforts for emerging and sudden outbreaks of major infectious diseases.⁵⁰⁹

JUNE 2019: LEGISLATURE PASSES LAW ON VACCINE SAFETY

On June 29, the Standing Committee of the NPC adopted a Vaccine Administration Law, which took effect in December 2019.⁵¹⁰ The law was China's first attempt to regulate vaccines in a comprehensive manner, and among other things, it established a regulatory system covering the entire life cycle of vaccines, created a vaccine marketing authorization holder system, codified the legal responsibilities of all parties involved in the vaccine production process, and clarified the compensation available to individuals who experience abnormal reactions to a vaccination.⁵¹¹

For the purpose of this study, it is important to note that this legislation was reactive. PRC authorities were clear that they drafted and passed the law in response to a vaccine safety scandal that occurred at the Changsheng Biotechnology Co. Ltd. in the city of Changchun in July 2018.⁵¹² The company was found to be selling ineffective vaccines, including those intended for children, and its leadership became the subject of a corruption probe.⁵¹³ The NPC drafted and passed the vaccine law less than a year after Xi issued an instruction to do so. Eleven days after passing the vaccine law, the NPC turned its attention to drafting a broader biosecurity law, which was also done at Xi's direction. As was the case with the vaccine law, the CCP leadership was clear about the urgency for the biosecurity law, but unlike the vaccine law, they were not explicit about what motivated them to prioritize the biosecurity law over other bills in the docket to be drafted.

JULY 2019: RESEARCHERS WHO SENT PATHOGENS TO THE WIV EXPELLED FROM CANADIAN LAB

On July 5, Chinese virologist Qiu Xiangguo, her spouse and molecular biologist Cheng Kending, and several of their students from China were expelled by Canadian authorities from Canada's only BSL-4 laboratory, the National Microbiology Lab in Winnipeg, and placed on administrative leave for an unspecified "policy breach" as the Royal Canadian Mounted Police conducted an investigation.⁵¹⁴ The couple's employment was formally terminated in January 2021,⁵¹⁵ and as of June 2021, the couple remained under investigation, possibly for espionage.⁵¹⁶ Canadian authorities initially described the incident as a purely administrative matter, but since 2021, they have acknowledged it is a matter of national security.⁵¹⁷

For the purposes of this study, it is important to note Qiu Xiangguo's connections to the WIV. Four months before she was escorted out of Canada's most sensitive

biocontainment laboratory, Qiu sent 15 samples (two vials each) of various strains of the two paramyxoviruses Ebola and Nipah to the WIV. Canadian health authorities denied at the time of her eviction from the lab that Qiu's removal was related to the sharing of samples with the WIV.⁵¹⁸

Qiu Xiangguo made at least five trips to China in 2017 and 2018, including two visits per year to the Wuhan National Biosafety Laboratory for up to two weeks each visit. In at least one of those biannual visits to the WIV, Qiu trained scientists and technicians at its newly opened BSL-4 lab. Qiu further met with collaborators in Beijing in September 2017, but their names were blacked out in the documents released to a journalist by the Canadian government.⁵¹⁹ The PLA AMMS Institute of Microbiology and Epidemiology, a research partner of the WIV, is based in Beijing. While it is not clear if Qiu met with PLA AMMS counterparts because the names of her collaborators were blacked out, we do know from Qiu's publications that she has collaborated with AMMS researchers based in Beijing and Changchun.⁵²⁰ No references to Qiu's visits were found on the WIV website.

JULY 2019: WIV LEADERS DISCUSS LAB'S "SHORTCOMINGS" AND "FOUNDATIONAL PROBLEMS"

On July 8, Xiao Gengfu, the CCP secretary at the WIV, held a political study session with WIV management that led to a discussion of problems with the facilities and operations at the new BSL-4 laboratory at the WIV. In keeping with Xi's admonition to "be good at making up the shortcomings, and even better at stressing the importance of reinforcing the foundation," the meeting participants "had an animated discussion focused on addressing current shortcomings and foundational problems that exist in the construction, operational processes, and maintenance processes of the P4 laboratory."⁵²¹ Xiao Gengfu summarized the discussion thusly: "[M]embers of the group of party leaders went through a deep investigation and study, and a wide-ranging [process] of soliciting opinions, in order to fully understand and recognize the shortcomings and foundational [problems] limiting the institute's development, and [they] raised measures that were targeted and could be operationalized to resolve [those problems]."⁵²²

Xiao Gengfu concluded by noting that "building the Institute's Center for Biosafety Mega-Science not only requires research staff to personally strengthen their awareness

of unexpected risks, to prevent and control the risks of [the spread of infectious disease] at all times, but also requires the management personnel for research support departments to raise the quality and increase the effectiveness of their work and earnestly serve the institute's development of science and technology innovation."⁵²³

JULY 2019: LEGISLATURE BEGINS DRAFTING BIOSECURITY BILL

On July 10, Li Zhanshu, the third highest ranking member of the CCP Politburo Standing Committee and the Chairman of the NPC Standing Committee, chaired a symposium to discuss drafting a biosecurity law, and framed the initiative as a response to Xi Jinping's instruction.⁵²⁴ Li called on cadres to "strengthen awareness of unexpected developments to the point that you think of danger even in times of safety."⁵²⁵ Li continued:

The Central Committee with comrade Xi Jinping as its core has placed a high degree of importance on the problem of biosecurity. General Secretary Xi Jinping has given important instructions on many occasions, and clearly pointed toward the direction that biosecurity work should go, and provided rules to follow. [We must] deeply carry out the instructions and requirements of General Secretary Xi Jinping, insist on the necessity and urgency of the biosecurity law based on an full awareness of the holistic view of national security, use legislation to establish a basic system and principles for the realm of biosecurity, give prominence to risk prevention, [and] use the law as a weapon to defend the biosecurity of the state and guarantee healthy lives for the people.⁵²⁶

Another of Li Zhanshu's comments suggested he was concerned about the misuse of biotechnology: "[We must] use legislation to guide and standardize the research and application of human biotechnology to walk the correct path, spur the healthy and speedy development of biotechnology, [and] prevent and reduce the dangers and losses that could occur."⁵²⁷

July 2019: WIV's Junior Managers Told to Focus on Problem-Solving

On July 12, the WIV held a political study session specifically for young cadres and junior managers that was presided over by He Changcai, the deputy secretary of the CCP committee at the WIV.⁵²⁸ In addition to the usual discussions of Xi Jinping Thought and the necessity for the WIV to meet the science and technology goals set by Beijing, He made comments that seemed to speak to the practical challenges of running a laboratory

that junior managers faced, and suggested that there may have been some aversion among them to dealing with certain problems: “Young management personnel should persist with orienting their work toward the problems, center their attention on the institute’s core projects, solve difficult problems with R&D services, identify the outstanding problems that are affecting the management of the institute, and squarely face the problems [in order to] solve the problems.”⁵²⁹

JULY 2019: WIV REQUIRES RENOVATION OF ITS HAZARDOUS WASTE TREATMENT SYSTEM

On July 16, the WIV issued its third notice of the year on the official procurement website of the PRC central government that was related to renovation or maintenance of major systems in its laboratory facilities. In this case, the WIV solicited contractors to renovate the hazardous waste treatment system at the BSL-4 lab on the Zhengdian Park campus.⁵³⁰ While reports conflict about when exactly the BSL-4 lab became operational, it was no more than two years before this tender was issued, and likely about one year in advance of this repair being needed. A contractor was selected on July 31 with a budget of approximately US\$147,319 (RMB 986,000), suggesting a major overhaul was necessary.⁵³¹ This project may have been part of the facilities’ upgrade plan that the WIV discussed with senior CAS officials from Beijing on April 28.⁵³²

July 2019: WIV Discusses “Hidden Safety Dangers,” Mid-Level Management Problems

Echoing reports in June, a political study session held at the WIV on July 17 alluded to biosafety problems with its BSL-4 laboratory: “The party members in attendance expressed their views and recommendations targeted at improving biosafety theory and biosafety technological training, and the system for screening and managing hidden safety dangers, as well as the sharing of high-precision instruments, the overall [process] of moving to the Zhengdian laboratory, and other issues.”⁵³³ Two additional reports published on July 19 reiterated concern about the quality of the WIV’s professional management first expressed by Xiao Gengfu on July 8. He Changcai, Xiao’s deputy on the WIV’s CCP committee, called on managers to “strengthen awareness of [the importance] of shouldering responsibility, daring to take responsibility, daring to accept the challenge of difficulties, exceling at steeling yourselves through your work, accumulating experience, elevating yourselves, and harvesting the [personal] growth [that results].”⁵³⁴

In another meeting, He Changcai lectured mid-level managers about the need to shape up:

Mid-level management cadres need to put stress on elevating your own capabilities, especially placing importance on study, study that leads to an awakening, study that leads to gains, using study to direct your work, and using study to give impetus to your work. In your work, you must have unrelenting determination, you must excel at scientific thinking, orient yourselves towards the problems, firmly grasp the critical problems, fully develop the spirit of hammering the nail, persist with what you have started until you finish it, grasp the real problem, and then [make sure] you grasp it again. Do not leave behind hand-me-down problems, [and] truly make your work effective.⁵³⁵

JULY 2019: WIV NEEDS NEW SYSTEMS TO DISINFECT THE AIR AND MANAGE VIRUS SAMPLES

On July 18, the WIV issued its fourth notice of the year on the official procurement website of the PRC central government – this time for a project involving the acquisition of an “ambient air disinfection treatment system” and a “scalable automated [virus] sample storage management system.”⁵³⁶ The tender did not specify which of the two WIV campuses needed to purchase these two systems, but considering that most of the other tenders were focused on the Zhengdian campus that houses the BSL-4 laboratory, it was most likely intended for the Zhengdian campus. Two subsequent reports in November 2019 from the Zhengdian campus alluding to problems with the storage of virus samples further suggest this tender was meant for the Zhengdian campus.⁵³⁷ The contractor was chosen on August 14, and the winning bid for these two procurements was a substantial sum, roughly US\$1.27 million (RMB 8,566,800).⁵³⁸ This project may have been part of the facilities’ upgrade plan that the WIV discussed with senior CAS officials from Beijing on April 28.⁵³⁹

July 2019: WIV Signs Agreement to Work with Customs on Military World Games

On July 24, the WIV signed a “comprehensive cooperation agreement” with the Hubei International Travel Healthcare Center,⁵⁴⁰ which is the provincial office of the state-owned work unit that is directly run by the National Entry-Exit Inspection and Quarantine Bureau of the PRC General Administration of Customs.⁵⁴¹ The signing ceremony was witnessed by a senior official from the Wuhan Municipal Administration

of Customs (WMAC),⁵⁴² and appears to have been a follow up initiative from the larger “strategic cooperation agreement” that the WIV signed with the WMAC just one month earlier.⁵⁴³ The primary focus of the July agreement was on “ensuring biosafety and biosecurity [threat] detection during the period of the 2019 Wuhan Military World Games.”⁵⁴⁴ The report concluded by noting:

In accordance with the comprehensive cooperation agreement, the Wuhan Institute of Virology and the Hubei International Travel Health Center will focus on launching cooperation in areas [such as] detection of emerging virulent infectious diseases [found by] customs, establishing a customs biological samples database,...research on pathogens[,] and research and development of new technology to detect [pathogens] in order to jointly make contributions to our nation’s prevention and control of emerging virulent infectious diseases.⁵⁴⁵

JULY 2019: NHC HOLDS LARGEST PUBLIC HEALTH EMERGENCY DRILL SINCE SARS

On July 25, the PRC NHC held an infectious disease tabletop exercise in Yinchuan, the capital of Ningxia Hui Autonomous Region, which the CCP-run Beijing News described as “the largest nationwide emergency drill for a public health incident held since SARS.”⁵⁴⁶ The hybrid event, which participants joined both in person and virtually, drew more than 8,200 officials from all of the PRC’s 31 provincial level jurisdictions.⁵⁴⁷

The scenario of the tabletop exercise was set in 2020 and described by Xinhua as follows: “This exercise was a comprehensive prevention and control drill for the import of a sudden outbreak of infectious disease. The exercise adopted a tabletop model, the background for which was Ningxia discovered an imported X viral disease epidemic, and a certain province experiences partial community spread....”⁵⁴⁸ The officials ran through various drills on how to report information to the central government, how to do an epidemiological investigation, standards for collection and inspection, announcement of a confirmed epidemic, medical treatment for the ill, etc.⁵⁴⁹ It is not clear when planning began for this exercise, but Xinhua implied that it was held in response to the WHO’s declaration that the Ebola outbreak in the Congo was a “Public Health Emergency of International Concern,”⁵⁵⁰ which occurred on July 17.⁵⁵¹

JULY 2019: WIV STUDIES XI’S “BLACK SWANS” SPEECH, PRIORITIZES “URGENT PROBLEMS”

On July 25, the WIV held a plenary session to study Xi Jinping Thought, and Xiao Gengfu, the secretary general of the CCP committee at the WIV, used the occasion to reiterate remarks that Xi made in a widely publicized speech on January 21, 2019.⁵⁵² According to a report on the WIV website, Xiao emphasized: “[S]tate security is matter of paramount importance. In order to uphold state security in the key areas of politics, economics, and society, we must maintain a high level of vigilance from the beginning to the end. We must be highly vigilant about ‘black swan’ incidents and also guard against ‘gray rhino’ incidents.”⁵⁵³ Xiao stressed that the WIV should work on risk reduction: “We must enhance our ability to neutralize risks, going past appearances to look at the root, doing all we can do to neutralize risks at the source, [and] prevent the transmission, layering, evolution, and escalation of various risks....”⁵⁵⁴

Consistent with earlier reports in July, Xiao’s comments on this occasion suggested the prevalence of morale issues among WIV personnel. After conducting an inspection in which he held roundtable discussions, personal interviews with individual researchers, and received formal reports from lab managers, Xiao pointed out: “[T]he development of the P4 laboratory needs to place importance on a harmonious culture. We must strengthen organized coordination inside the laboratory...[and] go the next step to strengthen the sense of belonging among our institute’s personnel in order to make the P4 laboratory exert a greater effect in establishing the Center for Biosafety Mega-Science.”⁵⁵⁵

Wang Yanyi, the director of the WIV, also noted unspecified “urgent” problems facing the WIV and repeated Xiao’s theme from earlier in July that core responsibilities were not being taken seriously enough: “She pointed out that the content of this meeting was full and accurate, highlighted the key points, and classified them according to the principle of their relative importance or urgency. [We must] prioritize solving the urgent problems we are currently facing, and regarding the next phase of work, conduct deployments and make arrangements to ensure that responsibilities are fully implemented, and work measures are completed to promote the stable and sustainable development of the institute.”⁵⁵⁶

Tong Xiao, party secretary and deputy director of the BSL-4 lab, likewise delivered a report titled “Safe Operations and Coordinated Development of the P4 Laboratory,” in which he “focused on the ‘stranglehold’ problem [and] meeting the requirements of the

state, and conducted a deep analysis of the major problems currently existing in the P4 laboratory and major lines of thinking about how to solve them from the perspective of the hardware and technological aspects of the laboratory facilities, the management of biosafety, the institute's coordinated development, incentives and awards for personnel, etc.”⁵⁵⁷

AUGUST 2019: DIRECTOR OF WIV BSL-4 LAB SUBMITS PAPER ON RISKS OF SYNTHETIC BIOLOGY

On August 6, Yuan Zhiming, the director of the Wuhan National Biosafety Laboratory, submitted an article that he co-wrote with American virologist James Le Duc for publication in the September edition of the Journal of Biosafety and Biosecurity.⁵⁵⁸ Readers will recall a team led by Yuan published a piece in February in the same journal that called biocontainment labs a “double-edged sword,” and spoke in detail about biosafety regulatory gaps in China. Yuan drafted another piece on his own in May for publication in the September edition that acknowledged additional biosafety challenges such as training, funding, and proper maintenance and upkeep of equipment and facilities. This piece submitted in August with Le Duc focused specifically on the risks presented by the rapidly growing field of synthetic biology, particularly gene editing.

Here is a sample of key themes, as articulated by Yuan and Le Duc:

The rise of synthetic biology, employing novel techniques like gene editing, can create new biological pathways and even microbes not known to exist in nature.... One area of research that received considerable attention recently is gain of function studies, especially those investigations attempting to identify key molecular changes that might lead to efficient person-to-person transmission of avian influenza viruses.... Many countries are relying on regulations targeting Genetically Modified Organisms to regulate synthetic biology. As synthetic biology advances, these regulations may be insufficient to meet future oversight needs, given their focus only on known organisms.⁵⁵⁹

The authors highlighted the essential role of well-trained personnel: “Biosecurity in synthetic biology is largely dependent on the trusted workforce in the laboratory, and therefore a great deal of attention must be paid to a culture of safety, as well as careful personnel recruitment, background screenings, and adherence to strict policies and procedures regarding laboratory access.”⁵⁶⁰

As documented by this study, a series of reports in 2018 and 2019, both prior to Yuan's publication and in the months that followed it, collectively portray a picture of the WIV encountering political pressure to produce scientific breakthroughs while struggling with personnel recruitment, equipment and construction issues, and the development of a culture of safety, and as a consequence, biosafety incidents, including at least one of significance, appear to have occurred at the WIV in 2019.

AUGUST 2019: CAS AUTHORS RAISE THE SPECTER OF A LAB LEAK CAUSING A PANDEMIC

On August 16, Wang Xiaoli and Tang Hong, two scientists at the CAS Institut Pasteur of Shanghai, penned an article in the Study Times, a daily newspaper published by the CCP Central Party School, and the CAS posted the article on their official website.⁵⁶¹ The article was titled "Taking the Community of Common Destiny for Mankind⁵⁶² as the Vision, Planning for Scientific and Technological Innovation to Prevent and Control Infectious Diseases."⁵⁶³ After briefly surveying the outbreaks of Ebola, H1N1 influenza, MERS, and Zika, Wang and Tang asserted that "epidemics of major infectious disease are by no means distant,"⁵⁶⁴ and argued that "accelerating scientific and technological innovation to prevent and control infectious diseases is both imperative and urgent."⁵⁶⁵

In a section on the "complex causes of the outbreak of infectious disease,"⁵⁶⁶ Wang and Tang noted that nature was not the only conceivable culprit, and that science itself could cause an epidemic: "From the perspective of threats, the advancement of biotechnology has increased the danger that microorganisms could be misused or become potential pandemic pathogens. Viral pathogens that cause infectious disease can also be man-made or unintentionally leak from a laboratory accident, such as in 2017 when Canadian scientists successfully synthesized a smallpox-like horse pox virus."⁵⁶⁷

While the timing of Wang and Tang's article, in retrospect, was somewhat curious, its matter-of-fact recognition that a laboratory accident could produce a pandemic was not unusual. In pre-pandemic China, nothing was considered contentious about the proposition that accidents happen, and that accidents involving laboratories can have terrible consequences for public health. In fact, the PRC Ministry of Foreign Affairs' official submission to the BWC in 2011 contained just such a recognition: "Accidental mistakes in biotech laboratories can place mankind in great danger. Synthetic biology in some civilian biotechnology research and applications may unintentionally give rise to

new, highly hazardous man-made pathogens with unforeseeable consequences.”⁵⁶⁸ A group of six scientists at the CAS, one of whom worked at the WIV, also warned of this possibility in 2016, publishing a piece in the official Bulletin of the Chinese Academy of Sciences that raised the specter of a laboratory accident not once, but three times, and linked such risks specifically to experiments that manipulate naturally occurring viruses and bioengineer novel pathogens.⁵⁶⁹

The CAS authors categorized the following as biosafety risk factors: “the man-made synthesis of various biological agents (biological macromolecules like XNA, enzymes, synthetic organisms such as [chimeric] viruses, synthetic products of gene editing technologies such as CRISPR/Cas9 and reverse genetics, etc.); and the exploitation, misuse, and erroneous use of technologies that are conducive to the reproduction, dissemination, and proliferation of various biological agents; [as well as the escape of] hazardous materials from biosafety laboratories.”⁵⁷⁰ The authors continued:

The occurrence of various biological hazards has always been under certain adaptive conditions, [when] one or several biological agents break out in a concentrated manner as a result of their unique reproduction (replication) and transmission methods to cause harm to humans (animals and plants) and the environment. This includes...man-made [incidents], such as biotechnology development activities that lack management and control; the leakage of dangerous materials from high-level biosafety laboratories; the disorderly development and commercialization of biotechnology products; military applications; and terrorist incidents.⁵⁷¹

Finally, the CAS authors predicted biosafety risks would only grow in the coming years: “The difficulty of supervising and regulating the security of pathogens [stored in laboratories] will increase, [and] the risk of experiencing great damage caused by human activity at, or leaks from, high-level biosafety laboratories will be greater.”⁵⁷²

August 2019: Safety Drills Involving Infectious Disease Held at Airports in China

In keeping with State Customs Administration Director Zhang Jiwen’s remarks in March, and following the NHC tabletop exercise in July, local governments held several similar airport drills for infectious diseases in August.⁵⁷³ On August 14, the Shanghai Hongqiao

International Airport held a biosecurity drill in preparation for hosting the World Import Expo that took an Ebola outbreak as its hypothetical scenario.⁵⁷⁴

On August 19, the National Customs Administration held a public health emergency drill at Chongqing Jiangbei International Airport that focused on responding to a scenario in which a Chinese company in “a certain country” experiences “an explosive mass outbreak of disease of unknown origin.”⁵⁷⁵ Zhang Jiwen spoke at the drill, and said it was conducted specifically in response to Xi Jinping’s order to “firmly construct an epidemic inspection line of defense at our ports of entry.”⁵⁷⁶ According to the state-run Legal Daily, Zhang Jiwen claimed: “[T]he current global public health situation is very complex and grim. [When] preventing infectious diseases, especially the sudden outbreak of major emerging diseases that spread across borders, time is not on our side and [the matter] brooks no delay.”⁵⁷⁷

The official Xinhua News Agency cited an unnamed expert with dual appointments at the CCDCP and the PLA AMMS as having lauded the drill’s realism and echoed verbatim Zhang’s assessment that “the current global public health situation is complex and grim,” which made the Chongqing emergency drill “vitally important.”⁵⁷⁸ Neither Zhang nor the unnamed expert explained what developments or trends they had in mind that warranted their rather severe characterization of the threat landscape for global public health.⁵⁷⁹ As this report will document, two weeks after these comments were made, Xi Jinping would repeatedly invoke the phrase “complex and grim” to describe the threat landscape facing the CCP, and in November, officials sent from Beijing to the WIV would adopt the same phrase to talk about biosafety conditions at that time.

On August 20, the Xi’an Municipal Customs Administration and the Shaanxi Provincial Health Commission also drilled a scenario in which the State Customs Administration relayed a report from the WHO that a close contact of a patient “suspected of having a certain infectious disease” had boarded a flight en route to Xi’an Xianyang International Airport.⁵⁸⁰

August 2019: Leading Biosafety Expert Calls for Urgent Attention to Regulatory Gaps

On August 20, Wu Guizhen, the leading biosafety expert at the CCDCP, submitted an article for publication in the English language journal *Biosafety and Health*. The article, titled “Laboratory Biosafety in China: Past, Present, and Future,” was published online

on October 31.⁵⁸¹ Wu's article acknowledged a series of risks and shortcomings in China's biosafety practices, which echoed those discussed by WIV researchers when U.S. diplomats visited the WIV in 2018 as well as the concerns outlined by Yuan Zhiming, George Gao, and others in publications from 2019 reviewed during this study.

Wu Guizhen emphasized that were regulatory gaps in need of immediate attention. She said there was a "pressing need to improve the regulatory standards system," particularly calling for better coordination to "propose necessary and prompt revisions of regulatory measures for biosafety, providing support and guidance for the development of synthetic biology, gene editing, and biological resource preservation and utilization." Wu noted that regulation of BSL-2 laboratories in China was "lacking," and concluded "more biosafety laws are urgently needed."⁵⁸² As noted above, the NPC first turned to drafting a biosecurity law in March 2019 and held a roundtable among drafters in July. As will be detailed later in this chronology, the bill passed out of committee in September, and the first reading of the bill by the full NPC Standing Committee was conducted in October.

AUGUST 2019: WIV LEADERS DISCUSS "RECTIFICATION AND REFORM" OF "CRITICAL PROBLEMS"

On August 23, Xiao Gengfu, the secretary general of the CCP committee at the WIV, called a meeting of party officials, party members, and mid-level management at the WIV, in which he delivered a report titled "Identifying the Disparities, Stressing Implementation, [and] Diligently Pioneering Biosafety Technological Innovation."⁵⁸³ Xiao's report focused on, among other things, "critical problems impacting the development of the research institute and hot topics of concern among personnel."⁵⁸⁴ An inspection conducted by Xiao produced a "detailed list of problems" consisting of "a total of 20 problems and five aspects" in which the WIV's work had fallen short.⁵⁸⁵

The WIV report did not describe what those 20 problems consisted of, but the following comments suggested some degree of severity:

Regarding those problems that could be immediately corrected as soon as they were identified, we earnestly launched specialized rectification, clarified the division of duties, applied pressure to implement responsibilities [at all levels], and held the institute's leadership and related departments accountable for completing their assigned responsibilities before the deadline. For problems that

need sustained rectification, [we must] place importance on top-level design, specifying [responsibilities] at every level...by means of precise organization, making careful arrangements [and] concerted efforts, [and] in the spirit of hammering the nail, [we must] accelerate [efforts] to push forward with various specialized rectification projects, ensuring that the reform is complete and thorough.⁵⁸⁶

Xiao concluded by emphasizing: “[T]his...has been a baptism in political ideology, and also a ‘comprehensive testing experience’ for the institute. By going through the implementation of sustained rectification of critical problems that are restricting the institute’s development, we firmly believe that the Wuhan Institute of Virology has the confidence [and] the capability to succeed at establishing a high-level biosafety laboratory and to safeguard and manage [our] work.”⁵⁸⁷

On August 28, two more political meetings were held at the WIV. The first meeting was presided over by a visiting CCP official from the CAS named Wang Daguo.⁵⁸⁸ Much of this meeting also focused on addressing problems at the WIV. For example, leading CCP cadres at the WIV were described as having “checked themselves against the party constitution and party regulations, and from the five angles of ideology, politics, work style, capabilities, and clean governance, and in a manner of frank and honest discussion, searched for inadequacies, analyzed the problems, launched criticisms and self-criticisms, proposed rectification measures, [and] truly achieved the effect of making everyone red-faced and sweating [while] enhancing unity.”⁵⁸⁹ In the second meeting held on August 28, Xiao Gengfu told the WIV leadership that they must prioritize “strengthening top-level design, and resolving the important problems that are restricting the development of the institute.”⁵⁹⁰

AUGUST 2019: EXPERT CLAIMS “IMPORTANT ADVANCEMENT” IN CORONAVIRUS RESEARCH

On August 31 and September 1, a conference was held in Beijing in which a progress report was delivered to the MOST regarding a state key R&D project to study major zoonotic diseases that cross the species barrier to infect humans, according to a report on the website of the CCDCP.⁵⁹¹ The conference was attended by more than 50 participants from a total of 17 different organizations, including universities, government ministries, and state-run laboratories like the CAS. The principal

investigator, Tan Wenjie, presented preliminary findings for the project, which was scheduled to conclude in 2020.⁵⁹²

Tan Wenjie is the director of the Viral Disease Emergency Response Center of the National Institute for Viral Disease Control and Prevention at the CCDCP, but he also holds concurrent appointments at the WIV's Center for Biosafety Mega-Science and the Central Theater People's Liberation Army General Hospital in Wuhan.⁵⁹³ Tan reportedly spoke of "the project team's important advancements, work highlights, and output of achievements since the launch of the project to study cross-species infection and transmission of important zoonotic pathogens such as coronaviruses, West Nile virus, and Chikungunya virus."⁵⁹⁴ The report did not describe what those "important advancements" were as they pertained to coronaviruses or at what laboratory they were made.

SEPTEMBER 2019: CAS POSTS ARTICLE ON THE IMPORTANCE OF "SAFE PRODUCTION"

On September 3, the CAS, the parent organization of the WIV, posted a report on its website titled "Safe Production has No 'Inspection-Exempted Work Units,' Much Less 'No Worries Work Units.'"⁵⁹⁵ The report stressed the importance of "safe production" – the theme of the WIV's annual conference on safety and security held in April – and urged vigilance against complacency.⁵⁹⁶ It described an industrial fire that occurred in Henan Province on July 19 that resulted from an explosion after a leak that was discovered on June 26 went unaddressed. 15 people perished in the fire and 16 others were injured. The report highlighted the fact that the facility where the accident occurred had won an award for safe production from the provincial government earlier the same year.⁵⁹⁷

"Controlling safety [conditions] is not a matter that can be settled once and for all. If you temporarily ignore some jobs, it won't necessarily cause a major issue, but safety allows no rest, not even for a moment. You must give more than 100 percent of your attention and care to it, every day control it, and every moment control it,"⁵⁹⁸ the report admonished, "As soon as you relax safety [measures], [you are] extremely likely to 'set a fire to yourself,' and burn yourself to the point that it makes people grieve and lament, when it is too late for regrets."⁵⁹⁹

The closing paragraph urged those responsible for safety inspections:

To be a good supervisory and regulatory department, you must bring the “no worries work units” into your supervisory and regulatory line of sight, and you certainly cannot let “one handsome [man] conceal a hundred ugly ones,” only seeing the “bright spots” while ignoring the “shortcomings.” Just because it is a “model enterprise,” you cannot “relax your grip” and “cut them some slack.” This will cause the enterprise to lose external constraints and supervision, and before you know it, management is relaxed, the requirements for standardized operations are relaxed, and they will even deliberately conceal their problems, the problems will accumulate and multiply, getting more severe as they accumulate until it leads to consequences that are difficult to remedy.⁶⁰⁰

While this report drew examples of safety incidents from industry, the fact that the CAS posted the report on its website reinforces the concerns expressed at the WIV in April that similar problems of safety laxity were evident at the WIV.

SEPTEMBER 2019: XI GIVES POLITICAL “STRUGGLE” SPEECH TO CENTRAL PARTY SCHOOL

On September 3, Xi Jinping gave an important speech to young cadres gathered at the Central Party School that was replete with unusually strong admonitions, such as, “[L]eading cadres must take the initiative to throw themselves into the middle of various struggles, when confronted by major matters of right and wrong, they must dare to brandish the sword, when confronted by contradictions and conflicts, they must dare to meet the difficulties head on, they must step forward bravely when facing crisis and hardship, and they must dare to resolutely struggle when faced with evil winds and noxious influences.”⁶⁰¹ Xi repeatedly stressed the importance of political “struggle” (56 times in the redacted Xinhua account of the speech) – a concept closely associated with the tumultuous era of the Cultural Revolution (1966-76) – and hailed it as the central key to the CCP’s political success.⁶⁰²

Notably, Xi repeatedly warned of unspecified difficulties that lay ahead, as if some battle were on the horizon just beyond their field of vision. According to the official Xinhua News Agency:

Xi Jinping emphasized that struggle is an art, and we must be good at struggle. In all kinds of major struggles, we must insist on enhancing our sense of unexpected hardship and maintaining the unity of strategic determination, the unity of

strategic judgment, the unity of military tactical decisiveness, and the unity of the process of struggle with the actual results of the struggle. Leading cadres are duty-bound to defend the country and must discharge these responsibilities [to defend the country] faithfully, coming as soon as you are called, proving you can fight after you arrive, and prevailing without fail when you fight.⁶⁰³

Xi told the young cadres that everything was at stake in the upcoming struggles, including the “great rejuvenation” that the CCP’s claims as its *raison d’être*: “Xi Jinping emphasized that the great rejuvenation of the Chinese nation cannot be achieved easily by beating gongs and drums. A great struggle must be waged to realize a great dream.”⁶⁰⁴ He continued to warn of dangers to come that seems strangely prescient: “As we move along the path forward, the risks and tests we face will only become more and more complex, and we will even encounter terrifying waves that are difficult to imagine. The various struggles that we face are not short-term but long-term, and they will accompany us at least throughout the process of achieving the second centenary goal. We must...fortify the will to fight. When a grave situation and the duties of struggle appear in front of us, we must have moral character, dare to attack, and dare to fight to win.”⁶⁰⁵

Xi continued to develop this theme of dangerously complex and grave situations, adding: “[L]eading cadres must receive strict ideological tempering through severe trials and political tempering through experience and practical training. In the middle of complex and grave struggles, you will go through the wind and the rain, broaden your horizons, strengthen your muscles and bones, and truly be forged to the point that pure gold proves its worth in a blazing fire.”⁶⁰⁶ He later added: “We must persist with steeling ourselves through major struggles. The more difficult and contradictory the place [we find ourselves], the graver and more complicated the situation, the more we can exercise courage, sharpen our will, and grow our talents.”⁶⁰⁷ As readers will soon learn, Xi’s repeated warnings of a “grave and complex situation” would reemerge in the rhetoric of an official sent from Beijing to Wuhan to admonish the WIV for problems with its “safety work” in November 2019.

SEPTEMBER 2019: **WUHAN GOVERNMENT** ISSUES HEALTHCARE DIRECTIVE

On September 5, the General Office of the Wuhan Municipal People’s Government drafted a public health preparedness memo titled “Notice Regarding the Issuance of the Implementation Plan for Reforming and Improving the Comprehensive Supervision

System of the Medical and Health Industries in Wuhan.”⁶⁰⁸ The directive was released to relevant government departments on September 17, but the text was not disclosed to the public until April 21, 2020.⁶⁰⁹ The directive represented Wuhan’s local implementation of State Council guidelines that were issued at the national level in August 2018.⁶¹⁰

While the impetus for this initiative clearly came from Beijing, the timing of its implementation in Wuhan may be significant, and perhaps was in response to relevant local events. Hubei Province, to which Wuhan is subordinate, issued its directive nine months earlier in December 2018.⁶¹¹ Other large municipalities, such as Beijing and Shanghai, did not release their directives until 2020.⁶¹² It is not clear what factors, if any, determined the September release of Wuhan’s directive, but the release did appear to coincide roughly with other official actions and events at the WIV and elsewhere in Wuhan, such as those taken at the airport, which were geared toward responding to an outbreak of infectious disease.

In the first section of the directive, titled “Primary Tasks and the Division of Responsibilities,”⁶¹³ the chief point of emphasis is “persisting with and strengthening the comprehensive leadership of the party.”⁶¹⁴ The directive specifically ordered officials:

[S]trengthen the party’s leadership of public hospitals,...implement the responsibility system for hospital directors under the leadership of the party committee,...strengthen the three-level party organizational framework of ‘hospital party committee – general party branch – party branch,’ and...insist on the organic fusion of party organizational activities with the professional work [of the hospital],...push forward with innovative activities, and be innovative with the content and vehicle for delivering political ideology work.⁶¹⁵

The directive also called for “party building” in private hospitals and for those party organizations to “join hands” with the party committees in public hospitals.⁶¹⁶

While the directive was wide-ranging in its content, including sections on topics from quality control measures to reducing the cost of medical services, its dominant concern, as detailed above, was “deepening the supervision and regulation of public health services” by the party-state.⁶¹⁷ In one section that bore that title, attention was drawn specifically to regulating laboratory safety and monitoring for the outbreak of infectious

disease in a list of priority areas: “[S]trengthen supervision and regulation of public health services in accordance with the law, [including]...the prevention and treatment of infectious diseases, [and] biosafety at laboratories...”⁶¹⁸ It called for measures to ensure infectious diseases were being reported to the authorities: “[S]trengthen monitoring and inspection of...the standardized reporting of major infectious diseases, standardized treatment, and follow-up management.”⁶¹⁹ It also required preparations for sudden outbreaks: “[S]trengthen on-the-spot investigations of the development of capabilities and quality of public health services in public health departments in public hospitals, ensuring the completion of public health services [related to] handling sudden incidents [and] the response to public health emergencies, urgent medical rescue [operations], and other duties.”⁶²⁰

SEPTEMBER 2019: WIV MANAGEMENT PERSONNEL CONTINUE TO FACE INTERNAL CRITICISM

On September 6, He Changcai, the deputy secretary general of the CCP committee at the WIV, reiterated comments that he made in July criticizing mid-level managers at the WIV. He once again suggested that WIV managers were not sufficiently thorough in their work: “Management personnel are confronted with various and sundry work. You must maintain patience, excel at applying scientific thinking, orient yourselves towards the problems, take the initiative to think through [various] ways and methods to solve the problems, [and] you must have the work spirit of persisting with what you have started until you finish it in order to be effective in your jobs.”⁶²¹

SEPTEMBER 2019: CCP LAUNCHES POLITICAL INSPECTION OF THE WIV'S PARENT ORGANIZATION

On September 11, the CCP Central Committee dispatched the No. 15 Inspection Patrol Group to the Beijing headquarters of the CAS, with a mandate to conduct a political inspection of its leadership.⁶²² The inspection of the CAS was scheduled to last for approximately two months, and as explained by Su Bo, the inspection group leader, “[I]nspections are political supervision, [and] a comprehensive and personal political examination of the performance of political responsibilities, duties, and missions by party organizations [under the] Central Committee and state organs.”⁶²³ The areas of focus were described as “violations of political discipline, party organizational discipline, [financial] ethics discipline, discipline with regard to the masses, work discipline, and

discipline in one's personal life...,”⁶²⁴ and the loyalty of the CAS to Xi Jinping was a persistent theme.

Su Bo stressed that the inspection would “take the ‘Two Upholds’ as its fundamental obligation,” and “search deeply for political deviation.”⁶²⁵ The “Two Upholds”⁶²⁶ is a political doctrine that maintains that the primary duty of all CCP cadres is to “resolutely uphold Comrade Xi Jinping’s core position on the Central Committee, and in the Party as a whole, and resolutely uphold the Central Committee’s authority and its centralized, unified leadership,” the purpose of which, some sources add, is “to ensure that all Party members act in unison.”⁶²⁷

An indicator of the importance that the CCP leadership placed on the CAS inspection can be seen in the fact that the CCP Leading Group that oversees the No. 15 Inspection Patrol Group presented its findings to a meeting of the CCP’s most senior decision-making body, its Politburo Standing Committee.⁶²⁸ A general summary of the findings posted on the website of the CCP Central Discipline Inspection Commission articulated 15 “principal problems” that were discovered during the inspection, a sample of which included: 1) a “persistent gap” between Xi Jinping’s important instructions on pursuing “leap frog development in science and technology” and the CAS’s implementation of Xi’s instructions, 2) “unsatisfactory [efforts] to implement the strengthening of the Party’s comprehensive leadership demands,” 3) “weak links in the work to manage and supervise [CAS] scholars,” 4) “the continued existence of formalistic and bureaucratic ways of doing things, and violations of the spirit of the Central Committee’s 8-Point Decision on Improving Party and Government Conduct,” and 5) “insufficient insistence on political standards in making personnel decisions.”⁶²⁹

Other comments in the report clearly indicated a desire to strengthen political control over CAS academic personnel. Su Bo admonished the CAS to “put into practice the ‘Two Upholds’ through real action,” and to “take further steps to manage and supervise personnel decisions with regards to scholars.”⁶³⁰ While it is unclear if the two events were related, the WIV held a political meeting attended by more than 50 of its personnel and management on September 3, eight days before the political inspection of the CAS began. The WIV meeting was convened to discuss the beginning of internal audits and to “warn” personnel about violations of CCP political discipline. The report indicated that those in attendance studied nine cases of CAS personnel at the department head

level or lower who had violated various aspects of the CCP Central Committee's Eight-Point Decision on Improving Party and Government Conduct since the late 2017.⁶³¹

Although Xi Jinping has demonstrated a much greater propensity for launching political investigations than his recent predecessors, there is also a history of tensions between the CCP and the CAS, with the former harboring ideological distrust of the latter.⁶³² It took the CAS many years to recover from the disruption and damage of the Cultural Revolution from 1966 to 1976.⁶³³ In this particular instance, however, the inspection of CAS leadership occurred as a part of a larger political campaign by the CCP Central Committee to inspect a total of 37 CCP and state-run organizations (of which the CAS was one) for their loyalty to Xi Jinping.⁶³⁴

SEPTEMBER 2019: WIV TAKES DOWN ONLINE DATABASE OF VIRUSES

September saw a reduction in transparency at the WIV, a diminishment in its collaboration with scientists outside of China, and an enhancement in its physical security posture. On September 12, apparently between the hours of 2:00 and 3:00 AM local time,⁶³⁵ the WIV took down its online depository of data on viral sequences called the Wildlife-Borne Viral Pathogen Database.⁶³⁶ This database was previously accessible to researchers inside and outside of China, with the exception of a password protection section, which held unpublished sequence data accessible only to WIV personnel.⁶³⁷ Records indicate an initial period of inactivity with the database between August 16-22, 2019, with a period of normal accessibility and activity restored from August 23 to September 12, when the database was taken offline for a prolonged period of time.⁶³⁸ At the time of publication of this report more than three years after it was first disabled, public access has not been restored.⁶³⁹

It does appear that the database was briefly accessible, but only intermittently, from December 2019 to February 2020.⁶⁴⁰ Late January and early February 2020 is when claims began to circulate on the Chinese internet alleging that the WIV was the origin of SARS-COV-2 outbreak.⁶⁴¹ The database has been completely inaccessible since those claims began circulating. The database reportedly contained more than 2,000 entries consisting of sample and pathogen data, including full and partial genomic sequences, collected from bats and mice. The WIV had reportedly collected more than 15,000 samples from bats, from which they had identified over 1,400 bat viruses.⁶⁴² The disabled database reportedly held an estimated 100 unpublished sequences of beta-

coronaviruses taken from bats – the genre of coronaviruses to which SARS-CoV-2 belongs – which has led some experts to speculate that the disabled database “holds essential information on SARS-CoV-2 origins.”⁶⁴³

Shi Zhengli, director of the WIV Research Center for Emerging Infectious Diseases and the CAS Key Laboratory of Special Pathogens as well as deputy director of the Wuhan National Biosafety Laboratory, was the administrator of the database.⁶⁴⁴ Public statements concerning the reason for disabling public access to the database and descriptions of the contents of the database made by Shi and her international collaborator Peter Daszak of the EcoHealth Alliance have raised more questions than answers. In December 2020, the BBC reported that Shi had told them that “the WIV’s website and the staff’s work emails and personal emails had been attacked, and the database taken offline for security reasons.”⁶⁴⁵

In an email dated 26 January 2021 and addressed to Mr. Tommy Cleary, Shi Zhengli wrote: “During COVID-19 pandemic, our Institute web server has been fiercely attacked (still going on sometime) and our Institute decided to close down some web pages and databases including our bat virus database. I’ve no idea when it will be open.”⁶⁴⁶ The DRASTIC Research Group has noted that “either the reason given for taking the database off is not correct...or the statement points at an outbreak in Sep 2019.”⁶⁴⁷ On March 10, 2021, Peter Daszak told Chatham House in an interview that the database had been taken down due to “about 3,000 hacking attempts,” as conveyed to him by Shi Zhengli. Daszak added that taking down the database was an “absolutely reasonable” response, and that the WHO team “did not ask to see the database” during its visit to Wuhan in January and February 2021. Daszak suggested such access was unnecessary because “we [EcoHealth Alliance] do basically know what’s in those databases.”⁶⁴⁸

Shi Zhengli further claimed in her email to Tommy Cleary that all genomic sequences of viral samples contained in the database had been published, but that claim contradicts a description of the database previously displayed on the WIV website that acknowledged the existence of a password protected section of the database where unpublished sequences were stored.⁶⁴⁹ Another indicator of the potential scope of viral sequences that the WIV possessed, but had not published, can be gleaned from the 2014 grants from the NIH to the EcoHealth Alliance published by the Intercept in September 2021.⁶⁵⁰

The grant renewal proposal R01 states that the WIV would be processing around 1,000 samples per year of bat SARS-like coronaviruses thought to pose a risk to humans.⁶⁵¹

SEPTEMBER 2019: WIV STRENGTHENS PHYSICAL SECURITY, SEEKS RENOVATION OF A/C SYSTEM

On September 12, the same day that the WIV took the Wildlife-Borne Viral Pathogen Database offline in the early morning hours, the WIV issued a notice on the official procurement website for the PRC central government seeking bids from contractors to provide unspecified physical “security services” for its facilities at the Zhengdian Park campus where the new BSL-4 lab is located.⁶⁵² Four days later, on September 16, the WIV issued another notice on the official procurement website for the PRC central government seeking contractors to bid for a “central air conditioning renovation project” at the Zhengdian Park campus.⁶⁵³ The project was expected to take almost seven months (210 calendar days) to complete, and a budget of up to approximately US\$586,709 (RMB 3,926,876.94) was allotted to pay for the renovation.⁶⁵⁴ It is unclear why modern laboratory facilities like those located at the WIV’s Zhengdian Park would require expensive renovations on a major system such as the HVAC unit so soon after they commenced operations.

SEPTEMBER 2019: WIV ADVISES WUHAN AIRPORT DRILL RESPONDING TO “NOVEL CORONAVIRUS”

On September 18, the Wuhan Municipal Customs Administration and other officials held two “emergency response drill activities” at the Wuhan Tianhe International Airport in preparation for Wuhan’s hosting of the Military World Games in October. One exercise involved the discovery of high-level radiation in a piece of luggage, and the second focused on responding to the outbreak of a novel coronavirus at the airport.⁶⁵⁵ The PRC state-run media described the scenario as follows: “[T]he drill simulated in real combat style...the whole process of handling the discovery of one case of a novel coronavirus infection at the airport customs lane.... [W]e drilled an epidemiological investigation, medical examination, real-time set up of a quarantine area, isolation and testing, the transfer of cases [to hospitals], hygiene management, and other stages [in the process].”⁶⁵⁶

Another local media report contained details about the drills that were not included in the Hebei Daily report that Xinhua reprinted at the national level. For example, one

salient fact that appeared in local reporting, but not in the Hebei Daily article that Xinhua reprinted, was that the airport worked with the WIV and the Hubei Provincial Health Commission to design and conduct the drill. A September 18 report from Chutian Transportation Broadcasting quoted Li Zhenhan, deputy director of the Wuhan Airport Customs Administration, as having stated that the drills involved “strengthening cooperation with the provincial health commission and the Wuhan Institute of Virology of the Chinese Academy of Sciences to establish cooperative mechanisms for epidemic notification, case transfer, and research of major infectious diseases.”⁶⁵⁷

The WIV’s involvement raises the possibility that it was WIV experts who suggested drilling an outbreak of a novel coronavirus. The WIV’s involvement is also consistent with a report that the WIV signed a “strategic cooperation agreement” with the Wuhan Municipal Customs Administration in June 2019, in which “the two parties would launch extensive scientific and technological cooperation in [the areas of] risk analysis and early warning prediction of sudden, emerging infectious diseases, the research, development, and application of technology to detect highly pathogenic pathogens, the training and exchange of biosafety personnel, and the sharing of pathogen resource data....”⁶⁵⁸ There is no public record that the September drills occurred on the official website of the Wuhan Tianhe International Airport. Some online media reports of the drills appear to have been removed, while others remain accessible.

Staff was able to locate only one other incident of a similar drill being held at the Wuhan Tianhe International Airport through public reporting. It was held in November 2014, and Ebola was the scenario in question.⁶⁵⁹ That drill was likely prompted by the Ebola outbreak in West Africa reported by the WHO in March 2014.⁶⁶⁰ While other airports in China have held safety drills in advance of their cities’ hosting of major international events, it appears that only Wuhan had specifically drilled for a “novel coronavirus” as a scenario for which to prepare.⁶⁶¹ Notably the safety drills performed in Beijing before the 2008 Olympics, and in Shanghai before the 2010 World Expo, did not focus on a potential coronavirus outbreak, even though the SARS crisis of 2003-2004 was still a recent memory.⁶⁶² Two analysts at a consultancy with an extensive network of contacts in China, writing in April 2020, suggested they had “reason to suspect that the emergency ‘coronavirus disposal’ drills at the Wuhan Tianhe International Airport in September 2019 could have involved an actual spillage of coronavirus that was reported as a ‘drill.’”⁶⁶³

SEPTEMBER 2019: GEORGE GAO WARNS OF RISK OF A "LETHAL RESPIRATORY PATHOGEN"

On September 18, the Global Preparedness Monitoring Board (GPMB), which is co-conveyed by the WHO and the World Bank, forewarned in their first-ever World at Risk Report of the growing risk of "a rapidly spreading pandemic due to a lethal respiratory pathogen."⁶⁶⁴ The report considered scenarios whereby such a pandemic could occur as the result of an accidental laboratory escape or intentional release, and called for the United Nations to conduct two high-level simulations over the following year (2020), one focused on a pandemic caused by a natural zoonotic spillover and another caused by a lethal respiratory pathogen that was engineered in a laboratory and deliberately released.⁶⁶⁵ Dr. George Fu Gao, the director-general of CCDCP, is one of 12 members of the GPMB Board of Directors that oversaw the production of this report.⁶⁶⁶ Gao published an article in March 2019 that warned how the genetic modification of pathogens could create new risks for epidemics by expanding their host range and increasing their transmissibility and virulence.⁶⁶⁷

In a September 10 report that was prepared by the Johns Hopkins Center for Health Security for GPMB to reference as background material when drafting the World at Risk Report, the team of scholars noted the potential for a biosafety incident at a laboratory to precipitate a pandemic: "Laboratory-acquired infections (LAIs) occur from occupational exposures to pathogens to those working in a laboratory. LAIs not only affect the health of the individual researcher but also pose a risk to the broader public health, as LAIs are a mechanism for accidental release of pathogens into the environment.... And it would be of potentially extraordinary consequence, even pandemic consequence, if a lab infection with a high-impact respiratory pathogen led to human spread outside the laboratory."⁶⁶⁸

SEPTEMBER 2019: BIOSECURITY BILL PASSED OUT OF COMMITTEE

On September 19, the Environment Protection and Resources Conservation Committee of the NPC reviewed and passed the biosecurity bill that the NPC began drafting in July in response to Xi Jinping's instructions.⁶⁶⁹ Its swift passage out of the committee of jurisdiction in September paved the way for the first reading by the NPC Standing Committee in October.

SEPTEMBER 2019: PCR TESTS PURCHASED, SUSPECTED COVID-19 PATIENT HOSPITALIZED

On September 21, the Hongshan District CDCP in Wuhan Municipality made two purchases of pathogen detection equipment and cited Wuhan's hosting of the upcoming Military World Games (October 18-27) as the justification for the purchases.⁶⁷⁰ Overall spending on PCR equipment in Hubei Province, for which Wuhan is the capital, jumped from 36.7 million RMB in 2018 to 67.36 million RMB in 2019.⁶⁷¹

There may be significance to the fact that the uptick of purchases of PCR testing equipment in Hubei Province in the fall of 2019 began in Wuhan's Hongshan district. Yu Chuanhua, professor of biostatistics at Wuhan University, gave an interview in February 2020 in which he discussed his work to compile a nationwide database of COVID-19 cases, both confirmed and suspected, which had 47,000 cases by late February 2020.⁶⁷² Yu noted several cases that predated those in December that the PRC authorities claimed were the earliest cases. "For example, there is data on a patient who became ill on September 29," he said. "The data shows the patient has not undergone nucleic testing, the clinical diagnosis (CT scan diagnosis) is a suspected case. The patient has already died. The data did not have a diagnosis [or] the date and time of death, it could also be incorrect data."⁶⁷³

The 61-year-old patient admitted on September 29 was identified by the surname "Su." Patient Su was treated at the Hubei Provincial Rongjun Hospital⁶⁷⁴ in Hongshan District, and some of her personal data that was reportedly disclosed to a Chinese medical journal revealed details about the patient's place of residence, indicating she likely lived in the Kaile Guiyan community on Zhuodaoquan Street, which is also located in Hongshan District, about 600 meters from the state-run hospital where she was treated.⁶⁷⁵ Professor Yu reportedly called the reporter two days after the interview to retract his statements, which may reflect pressure from PRC authorities to suppress the information that Yu disclosed.⁶⁷⁶

SEPTEMBER 2019: NATIONAL HEALTH SYSTEM HOLDS VIDEO CONFERENCE ON BIOSECURITY WORK

On September 26, the NHC held a "National Health System Video Conference on Biosecurity and Fire Prevention Work"⁶⁷⁷ for local governments to receive instructions on work to be done in advance of the period of the PRC National Day on October 1, which in 2019 was particularly significant because it marked the 70th anniversary of the founding of the PRC.⁶⁷⁸ The briefers called on local officials to "elevate the importance

of politics” and “shoulder the heavy responsibilities for safe production.”⁶⁷⁹ They were told to “deepen one-by-one inspections and rectification of hidden dangers,” and “organize and launch a security inspection that carpets the whole area in a single sweep, with full coverage, leaving no stones unturned....”⁶⁸⁰ Officials were expected to work overtime shifts and ensure 24-hour coverage to “do a good job with sending information reports on sudden incidents and significant incidents, ensuring the quality of the ‘first report,’ promptly reporting the incidents’ important information, and race against time to bring concentrated force to bear in solving the problem.”⁶⁸¹

SEPTEMBER/OCTOBER 2019: SPIKE IN HOSPITAL TRAFFIC, ANECDOTAL ACCOUNTS SUGGEST **OUTBREAK UNDERWAY**

A team of scientists led by a Harvard Medical School professor in June 2020 suggested that the novel coronavirus may have begun spreading in Wuhan as early as August 2019 based on the unusual increase in hospital traffic observed during September and October 2019.⁶⁸² The team made this inference on the basis of a couple of indicators, the most significant of which was their analysis of satellite imagery of vehicular traffic at hospitals in Wuhan. The satellite data showed a significant increase in vehicles parked at major Wuhan hospitals – an indicator previously established as a proxy for hospital occupancy rates – during the fall of 2019 compared to the same period of time in 2018. The pronounced increase in parked cars was observed at five of the six hospitals that were examined, as much as a 90 percent rise in some cases.⁶⁸³

Diplomats stationed at the U.S. Consulate General in Wuhan also attested to anecdotal observation of what they believed at the time to be a bad flu season. The Deputy Consular Chief writing in April 2020 recalled: “By mid-October 2019, the dedicated team at the U.S. Consulate General in Wuhan knew that the city had been struck by what was thought to be an unusually vicious flu season. The disease worsened in November.”⁶⁸⁴ An international student pursuing a Ph.D. at Wuhan University in 2019 told the Korean media outlet Arirang News in 2020 that he and others in Wuhan had become aware of an “outbreak of pneumonia” in September 2019, which was initially dismissed as an ordinary seasonal illness, but by November, the severity of the outbreak had increased to the point that public awareness was growing that something unusual was spreading.⁶⁸⁵

OCTOBER 2019: WUHAN UNIVERSITY **WARNS** ITS LABS ABOUT SAFETY

On October 14, the Laboratory and Equipment Management Office of Wuhan University circulated a notice to the university's laboratories calling for them to take steps to maintain lab safety during the period in which Wuhan was hosting the Military World Games (October 18-27). The notice required labs to carry out a "comprehensive investigation" aimed at the "elimination of hidden dangers."⁶⁸⁶ Another lab inspection report from Wuhan University in 2019 identified significant problems with safety conditions, including student adherence to safety protocols, storage of biochemical agents, and waste disposal.⁶⁸⁷ The WIV was birthed as a department of Wuhan University in the 1930s, and it remained a part of the university until it was absorbed by the CAS in 1956.⁶⁸⁸ The offices of the Wuhan branch of the CAS and the WIV's main research campus in Wuchang District are both adjacent to the sprawling campus of Wuhan University.

OCTOBER 2019: GEORGE GAO ATTENDS "EVENT 201" ON PANDEMIC RESPONSE

On October 18, the Johns Hopkins Center for Health Security, the World Economic Forum, and the Bill and Melinda Gates Foundation jointly assembled a group of 15 distinguished leaders from global business, government, and public health for a tabletop exercise in New York City.⁶⁸⁹ The group spent three-and-a-half hours role playing a team of high-level decision makers who had to recommend actions to mitigate the large-scale economic and societal consequences of "an outbreak of a novel zoonotic coronavirus transmitted from bats to pigs to people that eventually becomes efficiently transmissible from person to person, leading to a severe pandemic." The exercise featured a "pathogen and the disease it causes...modeled largely on SARS, but...more transmissible in the community setting by people with mild symptoms."⁶⁹⁰ George Fu Gao, director-general of the CCDCP, was one of the 15 participants,⁶⁹¹ and one of two who also served on the GPMB,⁶⁹² which issued a similar warning detailed above in its World at Risk Report on September 18.

OCTOBER 2019: WUHAN HOSTS MILITARY WORLD GAMES, ATHLETES REPORT ILLNESS

More than 9,000 international athletes representing over 109 countries traveled to Wuhan for the Military World Games that began on October 18 and concluded on October 27.⁶⁹³ Many of them, including athletes from France, Italy, Germany, Luxembourg, and Canada, reported that they became ill while in Wuhan, or shortly after returning to their home countries, with symptoms consistent with COVID-19.⁶⁹⁴ Eleven

Iranian athletes reportedly died of COVID-19, including some who participated in the Military World Games.⁶⁹⁵ One study used a mathematical model to assess whether cases of illness reported by athletes returning from Wuhan had any bearing on subsequent outbreaks and concluded: “There is a correlation between the number of individuals who travelled to the event and the number of COVID-19 cases in the country to which they returned.”⁶⁹⁶

OCTOBER 2019: FIRST READING OF DRAFT BIOSECURITY BILL, LAB LEAK IDENTIFIED AS A THREAT

On October 21, the NPC Standing Committee, led by Politburo Standing Committee Member Li Zhanshu, formally reviewed the draft law on biosecurity, which the NPC started drafting in July and passed out of committee on September 19.⁶⁹⁷ Preventing and prohibiting the use of biological agents and biotechnology to harm state security was described by the NPC leadership as the “main point” of the legislation.⁶⁹⁸ During the first reading of the bill, Gao Hucheng, the chairman of the NPC Environmental Protection and Resources Conservation Committee, delivered the official explanatory report to the NPC Standing Committee, articulating the purpose of the legislation and summarizing its key points. Xinhua published a photo of Gao delivering the report on the day that the first reading occurred, but the text of the report was not published until almost a year later on October 19, 2020, following the bill’s final passage. The NPC, not Xinhua, published the full text of Gao’s report, which means distribution was in effect limited to only those who regularly peruse the NPC’s website.

Xinhua published a contemporaneous report on the first reading titled “Draft Biosecurity Law Creates Penalties for Misuse of Biotechnology and Other [Mis]Conduct,” which summarized the legislation as follows: “Addressing the problem that our country’s laws lack penalties and regulations to address incidents of the misuse of biotechnology and other misconduct that have recently occurred, the draft clarified corresponding responsibilities and penalties, filling in a gap in the law.”⁶⁹⁹ Xinhua added:

The eight areas in which the scope of the draft was refined and modified were: 1) control and prevention of major sudden emerging infectious diseases, animal and plant epidemics, 2) research, development, and application of biotechnology, 3) safeguarding laboratory security, 4) safeguarding the security of our nation’s biological resources and human genetic resources, 5) preventing invasive external

[biological] materials and protecting ecological diversity, 6) dealing with microbiological resistance to medication, 7) preventing biological terrorist attacks, and 8) defending against the threat of biological weapons.⁷⁰⁰

Gao Hucheng's full report to the Standing Committee contained notable information that did not appear in public reporting; most significantly, Gao cited the leak of biological agents from laboratories as a threat to state security that warranted the swift passage of the law. He further called the biosecurity situation in China "grim."⁷⁰¹ Gao's comments were striking in their urgency, and suggested awareness of problems that were not public knowledge:

At the same time that biotechnology has brought progress and benefits to humanity, it has also brought new biosecurity problems and threats. Currently the biosecurity situation in our country is grim. Bio-warfare and traditional biological threats from major emerging and sudden outbreaks of infectious diseases represented by SARS, Ebola, and African Swine Fever, as well as animal and plant epidemics, are occurring as frequently as ever before. Non-traditional biological threats, [such as] bioterrorist attacks, the erroneous use and deliberate misuse of biotechnology, and laboratories that leak biological agents, are clear and obvious.⁷⁰²

Echoing Li Zhanshu's comments when drafting began in July, Gao Hucheng added, "[We must] urgently respond to the aforementioned challenges through biosecurity legislation, use the law to delineate the boundaries of biotechnology development, guide and standardize the research and application of human biotechnology, accelerate the healthy development of biotechnology, and prevent and reduce the dangers that arise from misconduct that harms [society] through biotechnology."⁷⁰³

Gao's characterization of the state of the life sciences in China was critical, almost censorious: "Currently our country's research and development of biotechnology and construction of [research] infrastructure are relatively backward. Large disparities exist in technology, products, and standards. There are few original biosafety technologies [that were invented in China] and few outstanding [research] achievements."⁷⁰⁴ In response to this poor state of affairs, Gao prescribed the following: "[We should] incorporate the building up of the state's biosecurity capabilities into the law..., firmly seize the key and core biotechnologies, protect and promote the development of our

nation's biotechnology and enhance our ability to prevent dangers and threats.”⁷⁰⁵ As we will see shortly, Gao's reference to the importance of “key and core biotechnologies” parallels reports published at the WIV in September 2018 as well as in June, July, and November 2019.

OCTOBER 2019: CCP CENTRAL COMMITTEE DECISION CITES INFECTIOUS DISEASE CONTROL

On October 31, 10 days after the NPC Standing Committee had the first reading of the draft biosecurity law, the CCP Central Committee adopted a decision to address “several major problems” pertaining to the modernization of the state administrative system.⁷⁰⁶ It was a sweeping decision that covered a wide range of issues, but of particular note for the purposes of this study was its prescient requirement that officials throughout China “strengthen prevention of public health epidemics and control and prevention of major infectious diseases, and improve the medical insurance and assistance system for major and serious diseases.”⁷⁰⁷ The decision further called for “strengthening the power of national strategic science and technology [and] improving the system of national laboratories.”⁷⁰⁸

OCTOBER/NOVEMBER 2019: RUMORS SPREAD OF A NEW VIRUS IN WUHAN, DOCTORS SEE INFLEX OF PATIENTS

Anecdotal accounts of an outbreak of a mysterious respiratory illness spreading in Wuhan date to October 2019, concurrent with Wuhan's hosting of the Military World Games. On November 22, Wei Jingsheng, a Chinese dissident who lives in exile in the United States, but hails from a family that played an important role in the communist revolution, told two American friends that he had heard from trusted and well-placed sources in Beijing that “there is a new, dangerous virus spreading in China,” which emerged in Wuhan.⁷⁰⁹ Wei confirmed his account in a separate conversation with Senator Rubio's staff, and noted that he had first heard about the virus during the Military World Games (October 18-27) when CCP sources told him it had been released accidentally in the process of conducting biological weapons research in Wuhan.⁷¹⁰ An investigative journalist in Australia interviewed a frontline doctor from Wuhan who said he and his colleagues began seeing a growing number of patients exhibiting fever and respiratory difficulties in early November, and realized that a coronavirus, likely SARS-related, was the causative agent by early December, but were forbidden by the authorities from discussing the situation.⁷¹¹

NOVEMBER 2019: HUBEI WORK PLAN POINTS TO NEED FOR “SAFE OPERATIONS” AT THE WIV

On November 1, the Hubei Provincial Development and Reform Commission issued a work plan for 2020 with a stated purpose of “accelerating the strategic rise of the central China region and promoting high-quality [economic] development.”⁷¹² In one section on “strengthening independent innovation in critical fields,”⁷¹³ the provincial authorities turned their attention to the role of the WIV in meeting its economic goals, and while relatively little was said, it suggested safety problems were on the minds of provincial authorities. The directive called on local officials to “ensure that the Wuhan National Biosafety Laboratory’s operations are highly efficient and safe, and aggressively push ahead with the construction of the East Lake laboratory.”⁷¹⁴

NOVEMBER 2019: WIV RESEARCHERS HOSPITALIZED WITH COVID-19 SYMPTOMS

The U.S. Department of State released a factsheet in January 2021 on its official website that stated the following: “The U.S. government has reason to believe that several researchers inside the WIV became sick in autumn 2019, before the first identified case of the outbreak, with symptoms consistent with both COVID-19 and common seasonal illnesses. This raises questions about the credibility of WIV senior researcher Shi Zhengli’s public claim that there was ‘zero infection’ among the WIV’s staff and students of SARS-CoV-2 or SARS-related viruses.”⁷¹⁵ In May 2021, the Wall Street Journal (WSJ) reported on previously classified details that went beyond what was contained in the State Department factsheet. These details included the fact that three WIV researchers became ill specifically in November 2019, all of whom ended up in the hospital.⁷¹⁶

In August 2021, Josh Rogin, a veteran foreign policy columnist for the Washington Post, revealed that the intelligence had further shown that at least one of the WIV researchers became ill in early November, that all three worked at Shi Zhengli’s bat coronavirus lab at the WIV, and that they exhibited symptoms highly specific to COVID-19, including the loss of smell and ground-glass opacities in their lungs.⁷¹⁷ “What it says is that the symptoms that these sick researchers had were not your everyday flu symptoms,” Rogin said, “In other words, they were COVID-specific symptoms necessarily, and these include no smell and what are called ground-glass opacities in the lungs. That doesn’t medically prove that they had COVID, but that’s some pretty specific symptoms.”⁷¹⁸

NOVEMBER 2019: WIV PURCHASES PCR TESTING EQUIPMENT

On November 6, the WIV purchased fluorescent quantitative PCR equipment used in the detection of viral RNA for RMB 308,440 (approximately US\$48,659), according to procurement orders on a Chinese website examined by an Australian research firm.⁷¹⁹ As is now widely known, SARS-CoV-2 is an enveloped, single-strand, positive-sensed RNA coronavirus, and PCR tests are used to detect it.⁷²⁰ PCR assay is also used to detect the genetic material of influenza viruses.⁷²¹ All in all, spending on PCR equipment in Hubei Province jumped from 36.7 million RMB (approx. US\$5.7 million) in 2018 to 67.36 million RMB (approx. US\$10.6 million) in 2019.⁷²²

NOVEMBER 2019: PEKING UNIVERSITY DRILLS RESPONSE TO LEAK OF HAZARDOUS BIOWASTE

On November 8, the School of Life Sciences at Peking University, China's oldest and most prestigious university, held safety drills to mark "fire prevention day," which the school observes annually on November 9. The school required all of its students and faculty to participate in the safety drills.⁷²³ In addition to drills in which the students practiced emergency evacuation procedures during a fire, the school also held a separate drill for students that simulated "a leakage accident" at one of the school's laboratories involving what was only described in general terms as "hazardous [bio]waste" and a "[micro]biological growth medium."⁷²⁴

NOVEMBER 2019: WIV'S CCP BRANCH ALLUDES TO PATHOGEN ESCAPE, POOR WORK CONDITIONS

On November 12, the CCP branch at the WIV's BSL-4 laboratory located on its Zhengdian campus published a report touting its achievements since the opening of the BSL-4 lab in 2018.⁷²⁵ The report noted the size of the party branch, and characterized the CCP cohort as a "young and enthusiastic team."⁷²⁶ It described various sessions that the party branch had held to study Xi Jinping Thought, and its work to expand the party's organizational reach inside the WIV, with a goal of "achieving full coverage of party building work."⁷²⁷

The report highlighted five issues of particular significance. First, it revealed that the so-called "stranglehold problem" had led to insufficient access to "key and core equipment" that is used to operate a lab safely. The party branch stressed:

[We] placed extreme importance on solving the "stranglehold" problem of importing key and core equipment, [and] by organizing meetings to exchange

views on the management of key and core equipment, in which the personnel responsible for managing each piece of key and core equipment introduced its structural composition, operational principles, control logic, and other aspects, everyone carried out fulsome discussions of the technologies, their biosafety [features], and the operating procedures for equipment that they were concerned about in order to continuously overcome the technological obstacles.⁷²⁸

Readers no doubt realize that this report was not the first to raise concerns about the “stranglehold problem of key and core equipment;” such references were first observed in WIV reporting in September 2018⁷²⁹ and at the Wuhan branch of the CAS in December 2018.⁷³⁰ In June 2019, the WIV published three separate reports⁷³¹ that cited the problem of stranglehold technologies, and yet another in July 2019.⁷³²

Pressure to deal with this problem came from the very top. The November 12 WIV report reminded its readers that Xi Jinping himself had “emphasized that ‘key and core technologies are the treasure of the nation,’” and that “the construction of the P4 laboratory is of extreme importance to public health in China.”⁷³³ A recent report by Hou Jianguo, the current party secretary and president of CAS, quoted Xi as having told China’s scientists: “Our country faces many problems with stranglehold technologies, [and] the root cause is we cannot keep up in basic theory and research, we have not understood the foundational things and the ground floor [that supports innovation].”⁷³⁴

While we were unable to locate WIV reports detailing the precise pieces of equipment affected by the “stranglehold problem,” the comments cited throughout this report clearly indicate that some equipment pertained to biosafety. We can further deduce from the existence of a “Research and Development Center for Key Equipment in Synthetic Biology” housed at the Shenzhen Institute of Synthetic Biology,⁷³⁵ which was founded by the CAS in December 2017, that 1) some of the equipment shortages at the WIV likely related to its work with manipulating viruses and bioengineering pathogens (i.e. synthetic biology), and 2) the “stranglehold problem,” as it applies to the fields of virology and synthetic biology, was China-wide, and not limited to the WIV.

The second issue of particular significance that featured in this November 12 report was its surprisingly frank description of the routine dangers of the work at the WIV’s BSL-4 lab, including its insinuation that a biosafety incident involving a dangerous pathogen had occurred:

Owing to [the fact] that the subject of research at the P4 lab is highly pathogenic microorganisms, inside the laboratory, once you have opened the stored test tubes, it is just as if having opened Pandora's Box. These viruses come without a shadow and leave without a trace. Although [we have] various preventive and protective measures, it is nevertheless necessary for lab personnel to operate very cautiously to avoid operational errors that give rise to dangers. Every time this has happened, the members of the Zhengdian Lab Party Branch have always run to the frontline, and they have taken real action to mobilize and motivate other research personnel.⁷³⁶

Third, this WIV report described a high-pressure work environment and other disadvantageous conditions that could create biosafety risk factors. "In the laboratory, they often need to work for four consecutive hours, even extending to six hours," the report revealed: "During this time, they cannot eat, drink, or relieve themselves. This is an extreme test of a person's will and physical endurance. This not only demands that research personnel possess proficient operational skills, but they also...possess the ability to respond to various unexpected situations."⁷³⁷ U.S. biosafety experts who have managed BSL-4 labs told Senator Rubio's staff that exceeding two consecutive hours of work in a BSL-4 environment is likely to lead to fatigue, and that they would not recommend going beyond three hours. The report noted that the lab's political leadership, specifically Tong Xiao, was constantly pushing the researchers at the BSL-4 lab to do more: "Don't look at your work duties as pressure. Every task is an opportunity and a ladder for continuous self-improvement. Our team's belief is that suffering losses is good fortune...."⁷³⁸

Fourth, the WIV report referenced problems with the construction of the BSL-4 lab, inadequate standards, and a lack of experience with relevant technologies. The party branch reported:

From the outset of construction, the Wuhan P4 Lab had been facing a predicament [caused by] the "three nos": no equipment and technology standards, no design and construction teams, and no experience operating or maintaining [a lab of this caliber]. Through the party members of the Zhengdian Lab Party Branch taking the lead to attack and conquer these difficulties, [and] bravely pressing forward, in the end, [we] brought into reality the "three haves" of a complete system of

standards, a superior team that operates and maintains [the lab], and valuable experience with construction.⁷³⁹

As we have seen with the “stranglehold” problem, the “three nos” were also a recurring theme in WIV reporting. On June 10, a visiting Hubei provincial CCP official acknowledged the problem, using terms almost verbatim to this November report, suggesting that CCP authorities had settled on that formulaic language as the framework for how the construction problems at the lab should be described.⁷⁴⁰ Another safety oversight that apparently occurred during the site selection phase of planning for the laboratory’s construction was flooding risk. The November 12 report recalled that the WIV was threatened by severe flooding in 2016, and how the “first thing the party members of the lab thought about was the safety of the equipment.”⁷⁴¹ It goes on to describe how the waters were so high that nearby streets were impassable, and researchers had to hike through a forested area bordering the Zhengdian campus to reach the laboratories and ensure their safety.⁷⁴²

Fifth, the party branch suggested that the WIV resorted to technical workarounds and modifications to deal with the “stranglehold” problem and the “three nos,” as well as to satisfy the CCP’s demands for indigenous innovation. The report noted: “Going through [a process] of digesting, absorbing, [and] reinventing imported equipment, [we] made the lab construction satisfy domestic and international standards, [and] made the French design concepts conform to the requirements of Chinese construction, etc.”⁷⁴³ It provided the following example: “For example, [regarding] the protective structure for the core zone of the laboratory, the research team, following repeated testing, used an advanced laser welding method, which had a better airtight effect and was longer lasting, to replace the traditional glue sealant method. The P4 team possesses the intellectual property patent for this technology. The mathematical model of [our] independent design with automated controls produced a more stable differential pressure control effect.”⁷⁴⁴ Workarounds applied to essential technologies, such as the sealing off a high-containment laboratory from the outside world, could have unintentionally created biosafety vulnerabilities, particularly when working with pathogens that transmit through aerosols, such as SARS-CoV-2.

Another interesting feature of this WIV report is that a CCP website run by the CAS published an earlier version of it on August 30.⁷⁴⁵ The November 12 version analyzed

above contained key information that was added later to the August 30 original text, and some deletions were also observed between the August and November texts. For example, the November version added a line to the opening that stressed the advanced nature of the BSL-4 lab complex: “They built and operate our country’s first P4 laboratory; this laboratory has the most advanced protective equipment and highest biosafety level.”⁷⁴⁶ Another new line pointed out that the seven most senior members of the team of technicians that built the laboratory were all CCP members.⁷⁴⁷ One possible reason that this detail was inserted, especially if one reads the November report as implying that an accident of consequence had happened, was to subtly solicit the protection of the CCP system, which tends to shield its own from accountability in times of trouble, provided that they “observed party discipline.”⁷⁴⁸

Another change that could be interpreted as the WIV researchers trying to ingratiate themselves to the political system was the addition of the two Xi Jinping quotes cited in the analysis above; neither of the quotes appeared in the August original. Other changes made the text less specific to the WIV. A sentence about the need to wear positive pressure suits and take chemical showers, which immediately preceded the sentence about excessively long work hours, originally designated “Wuhan P4 Laboratory Personnel” as its subject, whereas the revised version in November simply had “laboratory personnel” as the subject of the same sentence.⁷⁴⁹ Likewise, the clause in the pull quote above – “Owing to [the fact] that the subject of research at the P4 lab is highly pathogenic microorganisms...” – originally read: “Owing to [the fact] that the subject of research at the Wuhan P4 lab is highly pathogenic microorganisms....”⁷⁵⁰

The WIV’s admission that it had deviated from the French construction design was another piece of key information that made its debut in November. The August version simply stated: “Going through [a process] of digesting, absorbing, [and] reinventing imported equipment, [we] made the lab construction satisfy domestic and international standards.” It was the November version that added the clause “[and] made the French design concepts conform to the requirements of Chinese construction, etc.”⁷⁵¹ The example given of the WIV’s deviation from the French design – their decision to forgo the use of the traditional glue sealant in the hot zone of the laboratory in favor of their own novel laser welding method – was also missing in the original report but appeared in the November version.⁷⁵²

The most curious changes to the November report pertained to the passage that warned of the Pandora's Box that could be unintentionally opened as a result of "operational errors." Let us review the relevant passage again with the language that was added between August and November bolded for the sake of comparison:

Owing to [the fact] that the subject of research at the P4 lab is highly pathogenic microorganisms, *inside the laboratory, once you have opened the stored test tubes, it is just as if having opened Pandora's Box. These viruses come without a shadow and leave without a trace.* Although [we have] various preventive and protective measures, it is nevertheless necessary for lab personnel to operate very cautiously to avoid operational errors that give rise to dangers. Every time this has happened, the members of the Zhengdian Lab Party Branch have always run to the frontline, and they have taken real action to mobilize and motivate other research personnel.⁷⁵³

Needless to say, the colorful language they employed about how easily and surreptitiously pathogen escape can occur was a noteworthy addition in November, as were the words of wisdom about the precaution required to avoid operational errors. A question that seems inescapable is this: What prompted the authors of the report to insert these admonitory statements before republishing the piece on the WIV website on November 12?

NOVEMBER 2019: UNPUBLISHED GOVERNMENT DATA POINTS TO COVID-19 CASES

The China news editor of the South China Morning Post (SCMP), a veteran reporter with more than two decades of experience, reviewed official government data that documented a 55-year-old from Hubei Province (Wuhan is its capital), who contracted the virus on November 17, apparently the earliest confirmed case of COVID-19.⁷⁵⁴ "From that date onwards, one to five new cases were reported each day. By December 15, the total number of infections stood at 27 – the first double-digit daily rise was reported on December 17 – and by December 20, the total number of confirmed cases had reached 60," according to the SCMP.⁷⁵⁵ At the time of its publication in March 2020, the SCMP indicated that Chinese authorities had identified at least 266 people who were infected in 2019, all of whom came under medical surveillance.⁷⁵⁶ By contrast, the PRC authorities only acknowledged 174 cases of COVID-19 patients who fell ill in 2019 in their reporting to the WHO.⁷⁵⁷

The SCMP provided the following details on the earliest cases: “Of the first nine cases to be reported in November – four men and five women – none has been confirmed as being patient zero. They were all aged between 39 and 79, but it is unknown how many were residents of Wuhan.”⁷⁵⁸ An independent researcher who examined the publicly available genomic sequences for the reported COVID-19 cases in China identified a genetic cluster of the earliest Clad A patients, one of whom was a 39-year-old man who had a bronchial lavage specimen reportedly collected on January 5, 2020.⁷⁵⁹ According to the sequence records, this patient along with the other patients in this early genetic cluster were treated at the General Hospital of the Central Theater Command of the PLA, less than two miles from the WIV.⁷⁶⁰

As discussed earlier in this report, Yu Chuanhua, professor of biostatistics at Wuhan University, gave an interview in February 2020 in which he discussed his work to compile a nationwide database of COVID-19 cases. Yu’s database had many cases, one as early as September 2019 (see above), predating the cases in December 2019 that the PRC authorities claim were the earliest.⁷⁶¹ Yu noted the following about the cases captured in his database: “In November, there were two cases of [confirmed] patients, the onset of their symptoms was between November 14 and November 21, 2019.... [A]nother patient that got sick in late November was hospitalized on December 2, and was clinically diagnosed with pneumonia.”⁷⁶²

NOVEMBER 2019: **BEIJING RESPONDS** TO BIOSAFETY INCIDENT(S) AT THE WIV

On November 19, the WIV hosted a one-day safety training that was attended by senior personnel from the Wuhan branch of the CAS, the WIV’s parent organization, as well as WIV research department heads, other “responsible personnel” from all departments, and personnel who work on general safety and security matters for the WIV and CAS as a whole.⁷⁶³ Ji Changzheng, the director of the Office of Technology Safety and Security in the General Office of the CAS, was “specially invited” from Beijing to Wuhan to deliver a presentation that was titled “The Chinese Academy of Sciences Safety and Security Work: [The Current] Situation and Duties.”⁷⁶⁴ The most remarkable element of Ji’s report was that he conveyed “important oral and written instructions” from Xi Jinping to the WIV with regard to a “complex and grave situation”:

Ji Changzheng transmitted the instructions and demands of the CCP Central Committee and State Council regarding safety and security work and focused on

directing everyone [at the WIV] to internalize and implement the important oral remarks and important written instructions regarding safety work from General Secretary Xi Jinping and Premier Li Keqiang. At the same time, [Ji] linked [the instructions] to many large-scale cases of domestic and foreign safety incidents in recent years, and from the perspective of shouldering responsibility, standardizing operations, emergency planning, and inspecting hidden dangers one-by-one, [he] laid out a deep analysis, with many layers and taken from many angles, which vividly revealed the complex and grave situation currently facing safety work. Finally, Ji Changzheng focused on actual conditions at CAS with a summary and analysis of laboratory safety, technology security, student safety, campus security, and Internet security among other common problems that exist in its security and safety management work.⁷⁶⁵

The term “written instructions” used by Ji Changzheng referred to an internal CCP system of written directives called pishi (批示). A pishi occurs when a senior CCP leader receives a printed memorandum on a discreet issue, important development, or worrisome trend, and handwrites instructions on the report to be conveyed to the lower-level officials who are responsible for the subject of the report.⁷⁶⁶ An analysis of the significance of the pishi appears below at the end of this entry in the chronology.

In response to the safety problems experienced at the WIV, Ji Changzheng gave the following recommendations:

[T]o do a good job with safety management work, first, [you must] strengthen your knowledge and elevate the standing of politics [as a priority]; second, [you must] clarify [lines of] authority and responsibility, and push forward with the implementation of responsibility; third, [you must] plan, coordinate, and strengthen the administration of management controls; [and] fourth, [you must] strengthen research of scientific and technological safety and security risks and the building of an early warning monitoring system. Safety management personnel should strengthen their commitment to the mission, shoulder their responsibilities, and with single mindedness work together as one to build a protective barrier for scientific research and development....”⁷⁶⁷

Note that Ji’s reference to an “early warning monitoring system” echoes Xi Jinping when he said in January 2019: “It is necessary to speed up the establishment of an early

warning monitoring system for scientific and technological safety.”⁷⁶⁸ Likewise, Ji’s reference to a “complex and grave situation currently facing safety work” echoes Xi’s comments to the Central Party School in September 2019 when he repeatedly forecast “complex and grave situations” that would require cadres to engage in fierce political struggle.⁷⁶⁹

In addition to the summary of Ji’s remarks, the report noted that a security manager at the WIV also delivered remarks: “During the training, Hu Qian, the Deputy Director of the Office of Safety and Security at the Wuhan Institute of Virology, summarized several general problems that were found over the course of the last year during safety and security investigations, and [he] pointed to the severe consequences that could result from hidden safety dangers, and stressed that the rectification of hidden safety risks must be thorough, and management standards must be maintained.”⁷⁷⁰ Hu further admonished the lab managers to “strengthen the dissemination and implementation of the system of safety laws, regulations, and rules, take further steps to refine the operational work flow processes, prevent various kinds of safety risks, and ensure safe production for the research and development [activities] at the institute.”⁷⁷¹

ANALYZING THE SIGNIFICANCE OF JI'S VISIT

All indicators suggest that Ji Changzheng's visit to Wuhan was out of the ordinary and event driven. The timing was curious, coming on the heels of the conclusion of the two-month political inspection of the CAS that commenced at the direction of the CCP Central Committee in September.⁷⁷² We found only one report of another external engagement for Ji during November 2019, and that was a routine training at the CAS Institute of Botany, which is located in Beijing where Ji is based.⁷⁷³ No reports of Ji's work travel outside of Beijing were found for the months of October or December 2019, and in November 2019, he appears to have travelled only to Wuhan. Two inspection and training trips, one to the cities of Urumqi and Kashgar in the XUAR from August 27-28, and another to Hefei, the capital of Anhui province, from September 9-12, appear to have been his most recent travel prior to the November 19-22 visit to Wuhan.⁷⁷⁴

Notably, Ji's training sessions were often described as "annual" or "routine." The visit to the WIV was not described in those terms (Ji was "specially invited" to the WIV), and the WIV report had a more pronounced tone of seriousness than the other reports reviewed for this study. Moreover, the WIV had already held its annual biosafety training in April.⁷⁷⁵ Ji does not appear to have visited the WIV at any point prior to November 2019, insofar as can be established from searches of the WIV and CAS websites.

The available evidence further indicates that Ji Changzheng's discussion of the pishi was not a casual reference to a general directive but likely had specific relevance to the WIV. For the purpose of comparison and to aid in determining the significance of the WIV report, a total of 18 other reports published on the CAS website between 2017 and 2022 were reviewed for references to pishi from Xi Jinping and/or Li Keqiang. These reports described trainings and inspections conducted in whole or in part by Ji Changzheng at CAS facilities located in the cities of Beijing,⁷⁷⁶ Nanjing,⁷⁷⁷ Chongqing,⁷⁷⁸ Guangzhou,⁷⁷⁹ Urumqi,⁷⁸⁰ Kashgar,⁷⁸¹ Hefei,⁷⁸² Shenyang,⁷⁸³ Changchun,⁷⁸⁴ Ningbo,⁷⁸⁵ and Shanghai.⁷⁸⁶ Ji did not reference a pishi on "safety work" from Xi and/or Li in any of these 18 reports, including the 10 reports from 2019. The WIV report appears unique in this regard.

In two of the 18 reports, a passing mention of a pishi from Xi was found, but the reference was not attributed to Ji himself, and the pishi in question did not appear to be related to the pishi that Ji transmitted to the WIV. For example, in May 2018, Ji

conducted a training for Tibet-based CCP cadres held at the CAS Institute of Computing Technology in Beijing. During this training, another official, not Ji, referred to a pishi by Xi pertaining to “developing a cyber corps that meets the mark” to strengthen the party-state’s efforts to control Tibet.⁷⁸⁷ This is clearly unrelated to the biosafety-focused pishi that Ji delivered to the WIV.

In June 2022, an annual safety training held at the Changchun branch of the CAS made a general reference to “studying and transmitting the spirit of important oral and written instructions of General Secretary Xi Jinping on safety/security stability work.”⁷⁸⁸ While this pishi bears a closer resemblance to the one described at the WIV, it was not Ji who invoked it, and the description differed in its addition of the word “stability,” its lack of the urgent tone found in the WIV report, and the characterization of the event as an annual training, all of which suggests this pishi is different from, and likely came later than, the one invoked at the WIV.

It was also not the case that Ji Changzheng habitually invoked Xi Jinping’s name to draw upon his authority, with or without reference to a pishi. Twelve of the 18 reports of Ji’s activities included no mention of Xi at all. Only in two reports describing Ji’s visits to Shenyang and Ningbo in June and July 2022 respectively did Ji invoke the “spirit of General Secretary Xi Jinping’s important oral instructions on safe production.”⁷⁸⁹ Ji did not otherwise invoke Xi’s name in the 18 reports found on the CAS website, including in any of the eight reports from 2019 that did not pertain to the WIV. To reiterate, the only public report in which Ji spoke of a pishi on “safety work” linked to both Xi Jinping and Li Keqiang was the WIV report of November 19, 2019.

Ji Changzheng does not seem to be a man prone to rhetorical flourishes and hyperbole. Ji did not repeat a key phrase that appears in the report describing his visit to the WIV – the “complex and grave situation currently facing safety work” – in any of the other 18 reports outlining his activities elsewhere around the country. He only used that ominous language at the WIV. Furthermore, if we suppose that there was no pishi specifically applicable to the WIV for Ji to deliver, and Ji had merely sought to invoke Xi’s authority in a general sense to make his audience pay attention, Ji had two options available that he did not take. First, Ji could have followed the CCP convention of referring to a relevant leader’s speech. Xi Jinping had, after all, just delivered a long and detailed speech specifically to the CAS as recently as May 2018.⁷⁹⁰ Second, official CAS

reporting indicates that Xi issued a pishi specifically regarding “the work of the CAS” sometime in 2017.⁷⁹¹ Ji chose not to mention Xi’s 2018 speech to the CAS, or his 2017 pishi on the work of CAS, but rather referred to a pishi on “safety work.”

The pishi that Ji Changzheng invoked at the WIV appears to be distinct from Xi’s 2017 pishi. Official reporting described the focus of the 2017 pishi as “science and technology innovation,” and suggested it was largely congratulatory and positive in its tone.⁷⁹² Significantly, the word “safety/security” (anquan) was not mentioned a single time in the CAS report of Xi’s pishi in 2017, and yet that is precisely the word that Ji used to encapsulate the somber and serious theme of the pishi that he was tasked with transmitting to the WIV in November 2019.

The context of the WIV report leaves the reader with the impression that the memorandum that Xi Jinping and Li Keqiang received, which became a pishi after they wrote instructions in the margins, likely dealt with “safety work” relevant to the WIV in particular, or the CAS as a whole. Given the specialized nature of such a topic, and the virtually limitless range of potential problems that could be brought to the two top leaders’ attention on any given day in a country of more than 1.4 billion people, it stands to reason that the problem was deemed severe enough to warrant being raised to the highest level.

For another point of comparison, consider the fact that an explosion at a laboratory in Beijing, which killed three people and generated headlines, did not rise to the level of Xi Jinping or Li Keqiang, or prompt a pishi from either of them. The directive issued in response to the lab explosion only mentioned a pishi from “leading comrades in the State Council.”⁷⁹³ Not even Li Keqiang, the head of the State Council, was named, which means the issue was handled at the vice premier level or lower. Some observers maintain that Xi Jinping is a micromanager who is using the pishi system more frequently than his predecessors.⁷⁹⁴ In any case, most experts agree that Xi’s concentration of power in his hands and top-down decision-making style are now key features of CCP governance,⁷⁹⁵ which have been disruptive to the political system and provoked a backlash, both at home and abroad.⁷⁹⁶

NOVEMBER 2019: WIV HOSTS TRAINING ON “TECHNIQUES FOR CONDUCTING EXPERIMENTS”

Immediately following the small-scale session that Ji Changzheng held with the CAS and WIV management on November 19, he led a separate “Training on Biosecurity Laboratory Management and Techniques for Conducting Experiments” on November 20-22, which involved more than 150 WIV participants as well as personnel from BSL 1-3 labs at other research institutes in Wuhan.⁷⁹⁷ Zhao Chihong, the Director of Laboratory Management at the CCDCP, joined Ji to lead the training.⁷⁹⁸ “The content of the [training] course included the national biosecurity law, regulations, and standards, the management system for high-containment biosecurity laboratories, methods for assessing biosafety risks in laboratories, the storage of bacterial and viral strains, and the management of waste from animal experiments and laboratories,” according to the WIV website.⁷⁹⁹ It is worth noting that the problem of safe storage and handling of bacterial and viral strains will reappear as a theme of concern in a central government directive issued in February 2020.

Let us briefly consider the differences between this training and the November 19 meeting that preceded it. The fact that two separate reports were issued rather than one consolidated report of Ji’s visit suggests that these were viewed as two distinct events. Ji’s meeting on November 19 was aimed at WIV management, not its rank-and-file researchers. It was attended by senior managers, WIV research department heads, other “responsible personnel,” and personnel who worked specifically on safety and security matters. The training on November 20-22, by contrast, was much larger and inclusive in scope, with over 150 people attending from the WIV alone as well as researchers drawn from nearby labs. Zhao Chihong co-led the larger training with Ji; there is no mention of Zhao at the meeting on November 19. All of this suggests that the message that Ji was sent to deliver on November 19 in advance of the larger training was highly specific and likely deemed inappropriate for wider distribution to the larger audience that would assemble on November 20-22 for the more general biosafety training.

NOVEMBER 2019: ENGLISH TEACHER DEVELOPS PNEUMONIA, LATER CONFIRMED TO BE COVID-19

On November 25, a 25-year-old Welsh man named Connor Reed, who was teaching English in Wuhan at the time, fell ill with flu-like symptoms. The symptoms appeared to wane after a few days, only for Reed to develop pneumonia on December 6, which was

so severe that he sought hospital care because he feared he might suffocate.⁸⁰⁰ On January 16, 2020, the hospital that treated him for pneumonia formally informed Reed by letter that he had been infected by the novel coronavirus.⁸⁰¹ Reed kept a diary of the whole episode, the information from which he shared with various British print and broadcast media outlets beginning in March 2020 as the pandemic exploded in his home country. He became known as the first Briton to contract the virus.⁸⁰²

NOVEMBER 2019: WIV AND PLA SUBMIT PAPER ON ENHANCING CORONAVIRUS ENTRY TO CELLS

On November 27, a team of 13 Chinese researchers – including Shi Zhengli and Chen Jing of the WIV, Zhou Yusen and three others from the PLA AMMS Institute of Microbiology and Epidemiology, and seven others based in the United States – submitted a paper for publication in the Journal of Virology that examined the issue of antibody-dependent enhancement (ADE) of viral entry into human cells.⁸⁰³ This paper is significant for at least two reasons. First, it showed the close and collaborative relationship between the WIV and the PLA on coronavirus research detailed in the background section that precedes this chronology. Second, and more importantly, ADE is a major topic of concern for the development of vaccines and therapeutics, and the molecular mechanism behind it remains poorly understood.⁸⁰⁴ This study explored how a neutralizing monoclonal antibody (MAb), which targets the receptor-binding domain of the spike protein of the MERS coronavirus, mediates viral entry. “Our study reveals a novel molecular mechanism for antibody-enhanced viral entry and can guide future vaccination and antiviral strategies,” according to the authors.⁸⁰⁵ While the study in question focused on MERS, it is conceivable that this research played a role in a larger effort led by Zhou that was likely already underway to develop a vaccine for SARS-CoV-2.

NOVEMBER 2019: BRUCELLOSIS FOUND IN PATIENTS IN LANZHOU AFTER INCIDENT AT VACCINE PLANT

On November 28, health officials in Lanzhou Municipality, the capital of Gansu Province in northwestern China, discovered an outbreak of the bacterial disease brucellosis when patients from the Lanzhou Veterinary Research Institute presented themselves with symptoms.⁸⁰⁶ By November 2020, the total number of people infected as a result of the outbreak stood at over 10,000.⁸⁰⁷ According to a statement from the Lanzhou Municipal Health Commission issued in September 2020, the outbreak originated at a

biopharmaceutical factory owned by China Animal Husbandry Industry Co. between the dates of July 24 and August 20, 2019. It was caused by the factory having used expired disinfectants to manufacture vaccines, which left the bacteria present in its polluted gas produced as waste during the manufacturing process. The contaminated waste gas formed aerosols, which were carried by wind down to the Lanzhou Veterinary Research Institute, where the outbreak was first uncovered in November 2019.⁸⁰⁸

Although the brucella outbreak was caused by a biosafety incident, it occurred at a vaccine manufacturing plant, not a laboratory, and the PRC authorities did not refer to the incident as a “leak.”⁸⁰⁹ Moreover, because the incident was not discovered until November 28, 2019, according to the Lanzhou Municipal Health Commission, the timing precludes the possibility that the “explanation” submitted to the NPC Standing Committee on October 21 was referring to the brucella incident when it invoked the risk of a “laboratory leak” as a justification for passing the draft National Biosecurity Law.

NOVEMBER/DECEMBER 2019: WUHAN CLOSES SCHOOLS BECAUSE OF OUTBREAK

Some frontline doctors in Wuhan, who were interviewed by an investigative journalist in 2020, reported that classes in some high schools were cancelled in November 2019 because students were getting infected with what was being described as a severe influenza that had been observed throughout Hubei Province.⁸¹⁰ So severe was the “influenza” outbreak at the time that nearby Xianning, a city roughly 60 miles due south of Wuhan, had reported 20 times the normal rate of flu cases, many of which in Xianning and elsewhere were categorized as cases of “unknown cause.” Wuhan was reportedly the third worst infected city in the province.⁸¹¹

A diplomat stationed at the U.S. Consulate General in Wuhan, writing in April 2020, recalled that local authorities closed down public schools in December 2019, in response to what we now know was COVID-19, roughly two weeks before they admitted to the public that an outbreak was underway. The diplomat wrote: “When city officials began to close public schools in mid-December to control the spread of the disease, the team passed the word to Embassy Beijing and continued monitoring. The possibility of a new viral outbreak was always on the consulate’s radar. Still, the working assumption in every scenario had always been that, as in past outbreaks like H1N1 (known as swine flu), it would appear in rural areas first and then spread to major urban centers across China.”⁸¹² Another indication that COVID-19 cases were possibly being misdiagnosed

as influenza in fall 2019 is that the Chinese National Influenza Center stopped including data for flu cases in its weekly report beginning on the week of December 16-22.⁸¹³

DECEMBER 2019: THE ONSET OF SYMPTOMS FOR THE FIRST OFFICIALLY ACKNOWLEDGED PATIENT

On December 1, a man began to experience the onset of symptoms of COVID-19, who was later described by PRC authorities as the earliest patient who had “continuous exposure” to the Huanan Seafood Market in Wuhan, which the authorities would link to the outbreak starting on December 30. He also became the first fatal case. At the time of his symptom onset, none of his family members had developed fever or respiratory symptoms, but five days after his illness began, the patient’s 53-year-old wife, who “had no known history of exposure to the market,” developed pneumonia and was hospitalized.⁸¹⁴ On December 10, two more patients developed symptoms who had no exposure to the market, as did one patient who had market exposure.⁸¹⁵ This means that by no later than December 10, Wuhan doctors had documented three cases of patients with pneumonia that had no exposure to the market, strongly suggesting person-to-person transmission was likely occurring. In fact, a January 2020 study of officially acknowledged cases from December 2019 found that only 66 percent of such cases involved direct exposure to the market, meaning 34 percent could not be linked to the market at all.⁸¹⁶

In the words of the 29 authors of the study, all of whom were Chinese researchers and clinicians: “[E]vidence so far indicates human transmission for 2019-nCoV. We are concerned that 2019-nCoV could have acquired the ability for efficient human transmission.”⁸¹⁷ As will be documented later in this chronology, such evidence of person-to-person transmission was available to and recognized by astute Chinese experts from the very beginning. The authorities would withhold this information when they disclosed the outbreak to the public on December 31, and they continued to deny that person-to-person transmission was occurring until January 20.

Doctors and epidemiologists in China, concerned as they are with protecting public health, no doubt sought to share information about the transmissibility of the novel coronavirus long before January 20, and indeed some of them paid a high price for disclosing information about the outbreak without state authorization. Selective disclosure, manipulation, and withholding of key information from the public is the

habitual practice of China's secretive political leadership, even in ordinary times, much less when crisis strikes. The CCP seeks to "guide public opinion" through censorship as well as controlling and shaping the flow and content of information available to the public.⁸¹⁸ It is an essential element of what the CCP calls "ideological work" or "thought work."⁸¹⁹

DECEMBER 2019: WUHAN CDCP MOVES NEAR MARKET

On December 2, the Wuhan CDCP finished its relocation from one part of the city to a new location within walking distance of the Huanan Seafood Market,⁸²⁰ which at the end of December, authorities would link to the outbreak of "pneumonia of unknown origin." The moving process for the Wuhan CDCP likely began sometime in October.⁸²¹ It hosts a BSL-2 laboratory that works on bat coronaviruses among other pathogens. During the WHO's month-long study of the origins of the pandemic that was conducted in January and February 2021, the Wuhan CDCP made dubious claims (which the WHO accepted at face value) about its research activities that are contradicted by publicly available evidence: "The Wuhan CDC lab which moved on 2nd December 2019 reported no disruptions or incidents caused by the move. They also reported no storage nor laboratory activities on CoVs or other bat viruses preceding the outbreak."⁸²²

By contrast, publicly available Chinese sources indicate that Tian Junhua, a researcher at the Wuhan CDCP, claimed to have caught as many as 10,000 bats in the wild between 2012 and 2020, from which he captured tissue and virus samples that he stored at the Wuhan CDCP's BSL-2 laboratory.⁸²³ Just eight days after the Wuhan CDCP's move was completed, Tian featured prominently in a television documentary in which he was depicted in caves taking samples from wild bats without taking proper precautions (see below).⁸²⁴

DECEMBER 2019: WIV NEEDS AIR INCINERATOR, LOOKS TO OUTSOURCE BOILER ROOM OPERATION

On December 3, the WIV issued its fifth notice of 2019 on the official procurement website for the PRC central government, and this time the WIV was seeking to procure air incineration devices and testing services. The procurement notice did not specify which WIV campus needed this equipment, though it did note that the equipment was not produced anywhere in China. The budget allowed was approximately US\$46,232 (RMB 320,000).⁸²⁵

On December 16, the WIV issued its sixth procurement notice of 2019. The institute was seeking to hire an outside company for a year to operate the boiler room for its BSL-4 laboratory. Specifically, the tender defined the scope of duties required as “the operation, maintenance, and annual inspection of the thermal heating system components between the boiler room (including) and the outlet of the P4 [aka BSL-4] sub-cylinder.”⁸²⁶ The budget allotted was approximately US\$49,306 (RMB 330,000).⁸²⁷

DECEMBER 2019: HUBEI VICE GOVERNOR **INSPECTS** THE WIV’S BSL-4 LABORATORY

On December 5, Xiao Juhua, the vice governor of Hubei Province, visited the WIV to “inspect” its BSL-4 laboratory, according to the Hubei Daily.⁸²⁸ The report suggested that Xiao was not pleased with what she found: “Xiao Juhua conducted a site investigation of the Wuhan National Biosecurity Laboratory (P4 Lab) and gained a detailed understanding of the course of its construction, its current research, direction of development, etc., and immediately called a meeting [of lab management] to carry out support measures on site.”⁸²⁹ Xiao also sought to convey to the WIV its importance to the CCP in terms of state security and biotech development: “She pointed out that the Wuhan P4 lab has a significant status and function, and is related to state security, social stability, and the health of the people. It is an important foundation of [the plan] to make Wuhan a comprehensive national science center and an important pillar of the development of the Hubei biopharmaceuticals and health industry.”⁸³⁰

DECEMBER 2019: DUTCH VIROLOGIST LEARNS OF “**OUTBREAK OF UNKNOWN DISEASE**”

In May 2020, Dr. Ron Fouchier, a professor of virology and influenza expert at the Erasmus University Medical Center, appeared in a documentary filmed by the Dutch television program Tegenlicht (“Backlight”) on the Dutch public broadcast station VPRO. During the interview, Fouchier was asked: “Where were you when you first heard about the crisis in China?” and he responded: “We hear these things early on, so it was the first week of December. We were told about an outbreak of an unknown disease in Wuhan. The first few weeks of rumors were identical to the ones in 2003 with the SARS outbreak.”⁸³¹ Like the WIV, Fouchier is known for engaging in controversial gain-of-function studies that artificially modify viruses to better infect humans and increase their pathogenicity. In 2011, Fouchier caused a global stir as a result of his work to modify H5N1, a deadly avian flu that normally infects birds and only rarely infects humans in

its natural form, to render it highly transmissible through the air between ferrets, which catch the flu through the same mechanism as humans do.⁸³²

While Fouchier did not reveal in the VPRO interview from whom he heard about the “outbreak of an unknown disease in Wuhan” during the first week of December, it stands to reason that he would have heard it from a colleague in the field, which likely means a researcher at the WIV, whose studies of coronaviruses in some ways mirror Fouchier’s studies with influenza. PRC authorities would not publicly admit to the outbreak until December 31. Dr. Shi Zhengli, one of the world’s foremost experts on bat viruses and director of the WIV Research Center for Emerging Infectious Diseases, claims that the WIV had no knowledge of the outbreak until 7:00 PM local time on December 30, when the Wuhan CDCP sent patient samples to the WIV for testing.⁸³³ It strains credulity that a virologist in the Netherlands was informed, presumably by Chinese sources, about the outbreak by the first week of December, but the state-run WIV, located in the epicenter of the outbreak, knew nothing about it until December 30, which happens to be the first day that the authorities acknowledged the outbreak, albeit in a confidential memo to hospital managers.

DECEMBER 2019: WUHAN BATMAN GETS A DOCUMENTARY

On December 10, the state-run media outlet China Science Communication released a seven-minute documentary⁸³⁴ showing researchers from the Wuhan CDCP, led by Tian Junhua, collecting samples of viruses from horseshoe and pipistrelle bats in caves across Hubei Province.⁸³⁵ Tian said he had collected more than 300 bat virus samples over the last decade from Hubei. The documentary also boasted that Chinese researchers had identified nearly 2,000 viruses over the past 12 years, while the world as a whole had only identified 2,284 viruses in the 200 years prior to that.⁸³⁶

Richard Ebright, a microbiologist and biosafety expert at Rutgers University, noted the video was evidence that Wuhan CDCP lab staff had “unsafe operational practices (bare skin on faces, bare skin on wrists, no goggles, no face shields).”⁸³⁷ Tian has admitted in the past to being involved in breaches of biosafety with bats. Tian told a local news outlet in 2017 that he had bad blood splatter on his skin multiple times, and once had to quarantine after getting splashed with bat urine. In the documentary, Tian is featured noting, “It is while discovering new viruses that we are most at risk of infection,” though he is shown handling sample vials without wearing full protective gear.⁸³⁸

DECEMBER 2019: WIV FILES PATENT TO CORRECT PROBLEM WITH DIFFERENTIAL AIR PRESSURE

On December 11, six researchers from the WIV and the Suzhou Institute of Biomedical Engineering Technology, a sister organization in the CAS, jointly filed a patent application for an “integrated system for use in biological protection.”⁸³⁹ The main purpose of this new integrated system was to “detect the pressure in the air channel in real time through a differential pressure transmitter, which feeds the detected signal to the control module,...[which] then sends an instruction to the solenoid valve, which closes the air channel so that the pressure in the air channel can be monitored in real time and avoid dangers caused by the abnormal failure of the air channel.”⁸⁴⁰ Biocontainment laboratories require negative airflow conditions to maintain safe operations.⁸⁴¹

In the section of the patent discussing the background of this technology, its authors identified biosafety vulnerabilities that their patent sought to address, particularly those pertaining to filters:

At present, the joints of general high-efficiency filters are mainly based on chuck joints. If they are to be used in biological protection equipment, it is necessary to add multiple connecting pipes to fix them, especially for stability during [air] conveyance. Multi-segmented connections mean [potential] dangers at multiple segments. At the same time, multi-stage detection is required, and a stable and high-efficiency filtration device in the form of a module is urgently needed.... In addition, when an accident occurs during [air] conveyance, there is no effective monitoring device to assess whether the equipment is operating normally or not.⁸⁴²

The patent is significant for the purposes of this study because it showed that efforts were underway at the WIV in 2019 to better understand and remedy potential sources of airborne hazards in laboratories, such as a viral pathogen. Readers will recall that in September, just four days after the WIV took its database of pathogens and their genomic sequences offline, the WIV issued a notice on the official procurement website for the PRC central government seeking contractors to bid for a major renovation of the WIV’s central air conditioning system at the newly constructed Zhengdian Park campus.⁸⁴³ On December 3, the WIV issued another procurement notice for air incineration devices and

testing services.⁸⁴⁴ This patent application added a third data point between September and December 2019 that indicates the WIV was experiencing serious problems with its air handling and ventilation systems. The outbreak of an airborne viral pneumonia is one way that such problems could have become evident to the WIV leadership.

DECEMBER 2019: WIV NEW HIRES RECEIVE SECRETS TRAINING AS PART OF BASIC ORIENTATION

On December 11, the WIV held a training class for a group of 20 new hires, including full-time researchers and post-doctoral researchers. The deputy director of the office responsible for protecting state secrets at the WIV explained the basic requirements to the new entrants and further “linked them to recent cases of state secrets violations.”⁸⁴⁵ The reader will recall that all WIV researchers were required to undergo state secrets training on May 10,⁸⁴⁶ and the importance of maintaining secrecy also featured as a key subject of the basic training for the new class of graduate students at the WIV on September 3.⁸⁴⁷ Collectively, these three reports show that all of the existing researchers and graduate students, a new class of graduate students in the fall, and a cohort of new hires in December were required to receive state secrets training, which betrays the breadth of the work at the WIV that the party-state considers to be sensitive and confidential and underscores the state-run nature of the WIV.

DECEMBER 2019: U.S. EPIDEMIOLOGIST INFORMED OF “NEW OUTBREAK”

On December 15, Ian Lipkin, an epidemiologist at Columbia University, heard from Chinese colleagues about a “new outbreak” in Wuhan, according to Lipkin’s firsthand account to film director Spike Lee in an August 2021 documentary titled “NYC Epicenters: 9/11 to 2021 1/2.”⁸⁴⁸ To be clear, Lipkin claimed he was informed 16 days before PRC authorities made their limited disclosure of an outbreak of “pneumonia of unknown cause” to the Chinese public, and 15 days before Shi Zhengli claims that she first became aware of the outbreak. Lipkin has worked with Chinese counterparts for nearly 20 years and has been recognized by the PRC authorities for his work on SARS.⁸⁴⁹ Lipkin said he was informed by a Chinese colleague based at a university in Guangzhou over 600 miles from Wuhan.⁸⁵⁰ Lipkin’s account shows that knowledge of the outbreak was, at a minimum, spreading among scientists and public health officials much earlier than they informed the public.

DECEMBER 2019: CAS AND PLA SCIENTISTS REFERENCE “HOLES” IN BIOSAFETY MONITORING SYSTEM

On December 20, Wang Xiaoli of the CAS Pasteur Institute in Shanghai and Zhou Dongsheng of the PLA AMMS jointly published an article on biosecurity and biosafety in the Study Times, the official newspaper of the Central Party School of the CCP Central Committee.⁸⁵¹ Readers will recall that Wang was one of two CAS scientists who published a piece in the Study Times in August, just four months prior, which warned of the possibility of viral pathogens leaking from a laboratory accident. Wang’s December piece with Zhou continued to build on the theme of regulatory laxity leading to leaks: “The scope of the impact of sudden biological incidents has already expanded from the health of the populace to impact state security and strategic interests. Traditional biosecurity problems and non-traditional biosecurity problems are intertwined, external biosecurity threats and dangers from domestic supervision and regulatory holes exist side by side.”⁸⁵²

Wang and Zhou asserted that developing countries, a category still often applied to China by PRC authorities, have particular challenges when it comes to biosecurity and biosafety: “Developing countries lack both the capabilities and a control and management system for dealing with the negative effects of biotechnology, have obvious internal threats, and at the same time, many strategic directions in biotechnology suffer from the ‘stranglehold’ phenomenon, and have invisible external threats.”⁸⁵³ The authors stressed that “weak links” and “shortcomings” are quite prevalent in the biosafety and biosecurity prevention systems in developing countries.⁸⁵⁴ Xi Jinping would use these same terms employed by Wang and Zhou to describe the problems in developing countries – “regulatory holes,” “weak links,” and “shortcomings” – to describe the conditions in China that led to the outbreak of SARS-CoV-2 in remarks that he delivered less than two months later in February 2020.

DECEMBER 2019: MEDICAL STAFF QUARANTINED, AUTHORITIES DENY TRANSMISSION

As early as December 25, medical personnel in two hospitals in Wuhan were placed in quarantine due to suspicion that they had contracted viral pneumonia, according to an anonymous frontline doctor in Wuhan who spoke to a Chinese newspaper in late January.⁸⁵⁵ On December 30, a doctor at the Hubei Provincial Xinhua Hospital reported symptoms, which were later confirmed to have been caused by the novel coronavirus,

the second such known case of occupational transmission at this hospital in December.⁸⁵⁶ Occupational transmission of a virus among medical personnel is a clear sign of sustained person-to-person transmission, which the Wuhan authorities explicitly denied was happening in their first public acknowledgment of the outbreak on December 31 (“Up until now, the investigation has not yet uncovered obvious transmission from person-to-person nor infections of medical personnel”).⁸⁵⁷ PRC authorities at the central and local levels continued to deny that person-to-person transmission and occupational transmission among medical personnel were occurring until January 20, 2020.

DECEMBER 2019: DOCTOR ALERTS AUTHORITIES OF VIRAL ASYMPTOMATIC TRANSMISSION

On December 26, Dr. Zhang Jixian, the director of the Respiratory and Critical Care Department of the Hubei Provincial Hospital of Integrated Chinese and Western Medicine (also known as the Hubei Provincial Xinhua Hospital), treated an elderly couple with symptoms that included fever, coughing, and tiredness, which “looked like flu or common pneumonia,” Zhang recalled.⁸⁵⁸ On December 27, when CT scan results revealed ground-glass opacities in their lungs, Zhang summoned the couple’s son who lived with them to the hospital for testing. “He had no symptoms, but I discovered ground glass opacities in the CT scan of his lungs – a manifestation of viral pneumonia,” Zhang told Changjiang Daily.⁸⁵⁹

In addition, Zhang treated another patient on December 27 with coughing and fever, and ground glass opacities in lung CT scan. Blood tests for the first family of three and this additional patient all indicated they were suffering from a viral infection, and a series of influenza-related tests all came back negative.⁸⁶⁰ As soon as she reviewed the results on December 27, Zhang reported these findings to the Jiangnan District CDCP, and they dispatched someone to the hospital.⁸⁶¹ Another three patients presenting the same clinical conditions appeared at Zhang’s hospital on December 28-29, prompting the hospital management to call a meeting of specialists to discuss the situation on the afternoon of December 29.⁸⁶²

From this case, we can conclude that no later than December 27, district level authorities in Wuhan possessed convincing clinical evidence provided by a veteran respiratory specialist indicating that 1) the pneumonia outbreak was viral and not caused by influenza, 2) person-to-person transmission had occurred in a family cluster, and 3) a

person could be infected with the virus, manifesting unambiguous lung abnormalities, without presenting overt symptoms of illness, or before developing such symptoms, a fact which clearly raises the possibility of asymptomatic and/or pre-symptomatic transmission. In its first public admission of the outbreak on December 31, PRC authorities would falsely claim that the cause of the outbreak was unknown, and deny that any evidence of person-to-person transmission existed, much less asymptomatic transmission. PRC authorities would withhold these critical facts from the public for weeks after they knew them, and once admissions were made, the authorities continued to mislead the public by downplaying the severity of the situation.

DECEMBER 2019: VIRUS GENOME SEQUENCED BY DECEMBER 26, WITHHELD FOR WEEKS

Doctors from at least eight hospitals in Wuhan sent patient samples to multiple Chinese genomics companies, including the industry-leading Beijing Genomics Institute (BGI), for sequencing in December until the authorities stepped in to stop them. The results unanimously confirmed the pneumonia outbreak was caused by a SARS-like coronavirus.⁸⁶³ On the morning of December 26, Vision Medicals, a genomics company in Guangdong province, working on behalf of the Central Hospital of Wuhan, determined that a sample taken from a patient in Wuhan had tested positive for a SARS-like novel coronavirus. By noon, an “emergency meeting” was called at the company, which continued working through the day to sequence the genome and sketch a phylogenetic tree of the virus.⁸⁶⁴ By December 27, Vision Medicals had sequenced almost all of the genome of SARS-CoV-2, and shared its findings with hospital officials by phone as well as with the state-run Chinese Academy of Medical Science.⁸⁶⁵ PRC authorities, by contrast, did not admit to the world that the outbreak was caused by a novel coronavirus until 14 days later on January 9, 2020.⁸⁶⁶

The sample sequenced by Vision Medicals was taken from a 65-year-old deliveryman who worked at the Huanan Seafood Market and was admitted to the Central Hospital of Wuhan on December 18 with pneumonia. On December 24, doctors took fluid samples from his lungs and sent them to Vision Medicals for testing. In a departure from usual procedure, the company did not send back the results, but rather called the hospital on December 27 to inform them that it was a new coronavirus.⁸⁶⁷ Vision Medicals executives visited Wuhan shortly after that phone call to discuss their findings with local hospital officials and the Wuhan CDCP. "There was an intensive and confidential

investigation under way, and officials from the hospital and CDC had acknowledged many similar patients," according to Caixin.⁸⁶⁸

Using a sample sent to BGI by a hospital in Wuhan on December 26, BGI had fully sequenced the genome by December 29, making it the first known entity to do so.⁸⁶⁹ BGI sequenced at least three samples of SARS-CoV-2 drawn from different patients and reported its findings to the Wuhan Municipal Health Commission.⁸⁷⁰ PRC authorities waited for 15 days to release the sequence to the WHO, and when they finally shared it on January 12, 2020,⁸⁷¹ the move was taken in response to scientist Zhang Yongzhen having first deposited the genome on GENBNK on January 11, acting in defiance of Beijing's ban on unauthorized disclosure of information related to the virus.⁸⁷²

DECEMBER 2019: WHISTLEBLOWERS LEAK CONFIDENTIAL NOTICES TO THE WUHAN HOSPITALS

Thanks to whistleblowers in the medical community, knowledge of an outbreak of "pneumonia of unknown cause" in Wuhan first entered the public consciousness in China on December 30. On that date, the Wuhan Municipal Health Commission circulated two confidential "urgent notices" to the city's medical institutions. The first was sent at 3:10 PM local time, and stated "there has been a continuous occurrence of pneumonia cases of unknown cause at the Huanan Seafood Market in our city."⁸⁷³ It ordered hospitals to compile statistics on all such cases admitted in the previous week and report them to the commission by email before 4:00 PM⁸⁷⁴ – less than an hour after the notice was sent, indicating the urgency. The second urgent notice to the city's medical institutions went out at 6:50 PM on the same date. It stated: "Some medical institutions in our city have had a continuous occurrence of patients with pneumonia of unknown cause."⁸⁷⁵

It is worth highlighting that these two documents produced by the same office inside the same government body – the Wuhan Municipal Health Commission – described the basic facts somewhat differently over the course of only a few hours. The first notice said the continuous occurrence of pneumonia cases was "at the Huanan Seafood Market." The second notice placed it at "some medical institutions," and dropped the reference to the market altogether. That discrepancy may reflect competing internal assessments of whether the outbreak was linked to the market.

The notice prohibited its recipients from sharing information with anyone without state authorization: “[A]ll work units and individuals who have not received authorization must not arbitrarily release critical care information to the outside world.”⁸⁷⁶ A later investigation by the National State Supervisory Commission reported that the notice was leaked online within 12 minutes of its release to hospitals.⁸⁷⁷ Dr. George Fu Gao, the director of the CCDCP, reportedly first learned of the outbreak through the leaked notice, when he then called the head of the Wuhan CDCP and was told that the outbreak had been underway since the beginning of December.⁸⁷⁸

One of the whistleblowers who leaked the second confidential notice online was an ophthalmologist at Wuhan Central Hospital named Dr. Li Wenliang.⁸⁷⁹ Earlier in the day, Li had posted lab results from a patient that tested positive for “SARS coronavirus” in a social media group of former medical school classmates, noted that seven patients in a nearby hospital were quarantined in urgent care, and urged his classmates and their loved ones to take precautions.⁸⁸⁰ The lab results that Li shared were provided to him and several other doctors by Dr. Ai Fen, director of the emergency room at Wuhan Central Hospital, who also was reprimanded by the authorities for warning her fellow doctors of the coronavirus diagnosis.⁸⁸¹

DECEMBER 2019: NHC **DISPATCHES TEAM** TO WUHAN TO DIRECT EPIDEMIC RESPONSE

In the “wee hours” of December 31, the NHC dispatched a working group of experts from Beijing to Wuhan to “guide the epidemic response” in Wuhan.⁸⁸² The decision to send Beijing-based officials to Wuhan shows that local authorities were coordinating closely with the central authorities at that time. Their arrival in the early morning hours suggests that the NHC officials from Beijing met with local officials in Wuhan and provided guidance on the content of the public announcement in advance of its release by the Wuhan Municipal Health Commission at 1:38 PM local time on December 31.⁸⁸³ That announcement, the PRC’s first public acknowledgement of the outbreak, asserted that “at the present time, inquiries have found no obvious signs of human-to-human transmission and have not found infections among medical personnel.”⁸⁸⁴

These two claims, which were repeated by PRC officials at all levels more or less verbatim until January 20, almost certainly had their origin in political considerations about “stability maintenance.” The structural dynamics of the PRC government dictate that

decisions about when and what to disclose, and what to withhold, would have been made, at a minimum, in consultation with the central authorities in Beijing, and most likely, directly decided by them.⁸⁸⁵ There was no paucity of evidence on December 31. To the contrary, local authorities possessed clinical diagnosis of patient clusters, a full sequence of the genome of SARS-CoV-2, and knowledge of medical personnel being quarantined with the related illness.⁸⁸⁶

DECEMBER 2019: AUTHORITIES ACKNOWLEDGE OUTBREAK, DENY SPREAD BETWEEN PEOPLE

On December 31 at 1:38 PM local time, the Wuhan Municipal Health Commission issued a public notice (“situational report”) of the outbreak,⁸⁸⁷ in apparent reaction to the leaking of the confidential notices to hospitals online the day before. This notice was the first disclosure of the outbreak made by PRC authorities that was intended for the general public. The notice was titled “Wuhan Municipal Health Commission Situational Report on a Pneumonia Epidemic Currently in our City,” and it acknowledged a total of 27 cases of pneumonia that it explicitly linked to the Huanan Seafood Market in the first sentence of the notice.⁸⁸⁸ It claimed that only seven patients were in “serious condition,” whereas two had recovered and been released, and the remainder were in “stable condition.”⁸⁸⁹ The situational report did not indicate that a virus was the causative agent, but rather stated “at present, pathogenic detection and an investigation into the cause of infection are underway.”⁸⁹⁰

One of the two “urgent notices” to hospitals on December 30 and the situational report on December 31 claimed that unnamed medical institutions had linked the pneumonia cases to the Huanan Seafood Market. The situational report made this claim in its opening sentence,⁸⁹¹ and this claim would become a fixture of PRC official statements until May 2020. An epidemiological link between some cases and the market did exist, though not between the earliest cases and the market.⁸⁹² While this link was borne out by the available evidence for some cases, the inference that the outbreak began at the market was not justified because 34 percent of all patients admitted to the hospital for “pneumonia of unknown cause” before January 2 had no exposure to the market at all.⁸⁹³ By May 2020, the CCDCP would admit as much and rule out the market as the site of initial infection.⁸⁹⁴

Additional evidence quickly emerged that undermined the claim that the Huanan Seafood Market was the spillover site, such as the fact that the earliest case to be discovered outside of China, which was found in Thailand on January 8, involved a Chinese tourist who had never visited the market.⁸⁹⁵ Nevertheless, the public notice's framing of the outbreak in connection with the market proved to be durable, leading observers of all kinds, including many Chinese and international media outlets, to speculate that the market was the site of the original human infection for many months into the pandemic.⁸⁹⁶ Some international experts continue to engage in this line of inquiry,⁸⁹⁷ even after PRC CDCP experts ruled out the market as the site of the introduction of SARS-CoV-2 to humans, a position they adopted in May 2020 and have maintained to the present day.⁸⁹⁸

The public notice further claimed that “after the Municipal Health Commission received the report of the cases, it immediately [mobilized] the entire city’s medical and public health system to launch a search and retrospective investigation of the cases connected to Huanan Seafood Market.”⁸⁹⁹ It provided no date for when it received the initial report of pneumonia, and when those follow up actions were supposedly taken. The public notice listed the WIV among the group of public health, medical, and research institutions that had been mobilized in response to the outbreak. It is possible, perhaps likely, that the Wuhan Municipal Health Commission had been in close contact with the WIV about this matter much earlier than December 31 because as noted above, Hubei Vice Governor Xiao Juhua instructed the WIV to “proactively seek out the guidance and support of the National Health Commission...[and] closely coordinate with the provincial, municipal, and district [authorities]” during her inspection of the WIV on December 5.⁹⁰⁰

The public notice asserted: “[A]ll of the cases have been quarantined for treatment, and tracing, follow up investigation, and medical observation are underway for those who came into close contact [with the patients]. A health investigation and environmental sanitation disposal [effort] are currently underway at the Huanan Seafood Market.”⁹⁰¹ A dubious statement that appeared in the next paragraph, which would be repeated like a political mantra until January 20, subtly contradicted that set of claims: “Up until now, the investigation has not yet uncovered obvious transmission from person-to-person nor infections of medical personnel.”⁹⁰² The statement was factually untrue. The earliest patient acknowledged by the authorities experienced the onset of symptoms on

December 1. His wife, who had no exposure to the market, fell ill five days later.⁹⁰³ This means that no later than the second week of December, Wuhan doctors had documented clinical evidence of at least limited person-to-person transmission.

Moreover, as a medical matter, contact tracing and quarantine would be unnecessary if there were truly no reason to believe that person-to-person transmission were occurring. Another key statement also presumed transmissibility between people was occurring after just denying that it was: “The disease is preventable and controllable. For prevention, maintain air circulation indoors and avoid closed-off public spaces with poor air circulation and places where people gather. Wear a mask when leaving home.”⁹⁰⁴ This advice was based on the assumption that the pneumonia was viral and spreading through droplets and/or aerosols. It was inconsistent with the official denial of person-to-person transmission.

More importantly, medical personnel in Wuhan had reported to officials in late December that they had observed ample signs that the coronavirus could be transmitted between people, including infected patients who had never been to exposed to the Huanan Seafood Market and medical workers who were falling ill after treating infected patients.⁹⁰⁵ See the section above that details four cases identified by Dr. Zhang Jixian on December 27 (“Doctor Alerts Authorities to Clear Evidence of Viral Asymptomatic Transmission”). The notice further claimed that “testing to determine the cause of the disease...and an investigation into the cause of infection are currently underway.”⁹⁰⁶

From the aforementioned investigative reporting by Caixin, we know that multiple companies, including BGI, had sequenced the genome of SARS-CoV-2 before December 31, determined that it was a novel betacoronavirus, and shared their findings with the Wuhan Municipal Health Commission. China’s experience with SARS-CoV-1 would have immediately alerted its scientists to the high likelihood that a novel coronavirus from the same sub-genre would also be highly contagious and lead to sustained transmission between people. The notice even acknowledged that a coronavirus was one of several known causes of viral pneumonia,⁹⁰⁷ but it stopped far short of a definitive statement that the outbreak was caused by a coronavirus. From December 30 to January 9, the authorities maintained a pretense of uncertainty around the nature of the causative agent, even though its genome had been sequenced multiple times by different commercial actors prior to December 30.

THE CHRONOLOGY: 2020

JANUARY 2020: AUTHORITIES SHUT DOWN AND SANITIZE MARKET LINKED TO OUTBREAK

On January 1, Hanjiang District authorities in Wuhan cleared out the vendors at the Huanan Seafood Market and informed the public that the market's operations would be suspended until further notice. Just the day before, the authorities had publicly linked the outbreak of pneumonia to the market and sent crews to begin disinfecting the grounds.⁹⁰⁸ Some contemporaneous media reports as well as a study published in June 2021 documented the sale of various live mammals, poultry, and reptiles at the Huanan Seafood Market, including some wildlife trade, but no bats or pangolins were traded there.⁹⁰⁹ Most wet markets in Wuhan reopened when the lockdown was lifted in the city on April 8, but the Huanan Seafood Market did not reopen at that time and does not appear to have reopened at the time of writing.⁹¹⁰ Some observers interpreted the shutdown and clean-up effort as attempts by officials to destroy evidence of a zoonotic spillover event at the market,⁹¹¹ particularly in light of the history of SARS-CoV-1 having been introduced into a human population through zoonosis at a market setting in southern China in 2003.

JANUARY 2020: PARTY/STATE-RUN MEDIA AND SECURITY OFFICIALS TARGET WHISTLEBLOWERS

Starting on January 1, the local authorities in Wuhan and central authorities in Beijing joined forces to retaliate against the whistleblower doctors who forced their hands on December 30, making a public example of them to deter any others from following suit. On the afternoon of January 1, the Wuhan Municipal Public Security Bureau announced on its official Weibo social media account that it had “already investigated and dealt with eight rumormongers according to the law,”⁹¹² who had “disseminated and reposted untruthful information online that caused a harmful effect on society.”⁹¹³ The People's Daily, the official mouthpiece of the CCP, published an article on the morning of January 2 further highlighting the news that the rumormongers had been punished.⁹¹⁴ Later that same day, the state broadcaster CCTV also ran the report on its nationwide evening TV news segment.⁹¹⁵

The party-state appears to have been trying to intimidate would-be whistleblowers, as they had not, in fact, punished Dr. Li Wenliang at the time that they launched the public

campaign to criticize him and the others. Public security officials summoned eight medical personnel responsible for leaking the relevant information online on January 3, including Li⁹¹⁶ – the day after they were lambasted by state and party media. Security officials questioned these whistleblowers at length and forced them to sign a self-confession for “spreading rumors” about the pneumonia outbreak,⁹¹⁷ which they had accurately described as similar to SARS. The document that security officials compelled Li and others to sign read in part: “We solemnly warn you: If you keep being stubborn, with such impertinence, and continue this illegal activity, you will be brought to justice – is that understood?”⁹¹⁸ The mistreatment of Li and other whistleblowers was an example of the CCP using humiliation as a tactic to force elites to conform to its political edicts, even when such conformity violates their professional ethics and judgement.⁹¹⁹

We can confidently conclude that the central authorities were aware of the punishment of Li Wenliang and the other whistleblowers because the matter was covered prominently by media outlets that are directly controlled by the CCP Central Propaganda Department based in Beijing, not in Wuhan. Moreover, this was the first, but not the last, known incident of punitive measures being taken against whistleblowers in Wuhan during the pandemic. At least 254 people would be punished within a week for “spreading rumors.”⁹²⁰ Journalists, lawyers, and other concerned Chinese citizens who subsequently tried to document what was happening in Wuhan for the general public and posterity, such as Li Zehua,⁹²¹ Chen Qiushi,⁹²² Fang Bin,⁹²³ and Zhang Zhan,⁹²⁴ were all detained, disappeared, and/or sentenced to prison.

JANUARY 2020: BEIJING IMPOSES GAG ORDER, MANDATES DESTRUCTION OF VIRUS SAMPLES

Beginning on the first day of 2020, PRC authorities implemented a gag order against medical professionals, academic researchers, and commercial biotechnology firms sharing any information related to the outbreak of SARS-CoV-2, the nature of the virus, and key pieces of data, such as samples of the virus. Commercial genomic sequencing companies were targeted first because they had already processed sequencing results for hospitals in Wuhan in December.

On January 1, after several batches of genomic sequencing results had been returned to hospitals and submitted to the health authorities, an employee of one genomics company received a phone call from an official at the Hubei Provincial Health Commission

ordering the company to stop testing samples from Wuhan related to the new coronavirus, and to destroy all existing samples, according to Chinese investigative journalists.⁹²⁵ On January 2, Wang Yanyi, the director of the WIV, citing an order from the NHC, reportedly circulated a notice within the WIV that strictly prohibited the disclosure of any information related to the virus or the outbreak. It specified that nothing could be shared with the media, even state-run official media, or with “partner organization (including technical services companies).”⁹²⁶

On January 3, the gag order was applied nationally when the General Office of the NHC issued a classified, red-letterhead directive⁹²⁷ called the “Notice on Strengthening the Management of Biological Sample Resources and Related Scientific Research Activities in the Prevention and Control of Major Infectious Diseases.”⁹²⁸ The directive forbid researchers, medical professionals, and others from publishing or sharing any information related to the virus without state authorization and ordered labs in possession of relevant samples to transfer them to designated institutions or destroy them.⁹²⁹ The order, which both Caixin and Senator Rubio’s staff have seen, did not specify any designated testing institutions. One virologist told Caixin that even the WIV was not authorized to do testing and was told to destroy the samples in its lab.⁹³⁰ Despite the leaking of the NHC directive in April 2020, which applied to all laboratories throughout China, Shi Zhengli denied in a July 2020 interview with Science Magazine that she was ever instructed to destroy any virus samples.⁹³¹ The directive also reportedly instructed hospitals to not enter data from coronavirus patients into the surveillance system set up by the CCDCP to track outbreaks.⁹³²

At the time of printing of this report, PRC authorities had still not allowed Chinese researchers to engage in the exchange of clinical samples or isolates of SARS-CoV-2 with international counterparts, and the prohibition appears to extend to related coronaviruses, such as RaTG13. Senator Rubio’s staff spoke with American experts with a history of collaborative research with the WIV who confirmed that the exchange of samples ceased entirely after the outbreak. WIV coronavirus expert Shi Zhengli reportedly planned to share a sample with an American research partner at the Galveston National Laboratory, but officials in Beijing blocked her from doing so.⁹³³ Another U.S. coronavirus expert who pioneered the “no-see-um” method of viral genome manipulation,⁹³⁴ and collaborated with Shi on studies that involved bioengineering chimeric viruses,⁹³⁵ referred at the time to the PRC authorities’ prohibition on the

sharing of clinical samples euphemistically as “bureaucratic hurdles.”⁹³⁶ The NHC obviously knew exactly what it was dealing with – a novel coronavirus – when it composed and disseminated this confidential directive, which further demonstrates that the decision to not acknowledge the causative agent until January 9 was a political one.

January 2020: Beijing Communicates with WHO Only After WHO Requests Information

The China Country Office of the WHO first became aware that cases of pneumonia of unknown etiology had been detected in Wuhan on December 31, the same day that the public notice was released by the Wuhan Municipal Health Commission.⁹³⁷ PRC authorities did not, however, notify the WHO or bring its attention to the public notice. The WHO learned of the situation because of an open-source platform that scouts for intelligence on outbreaks. The WHO then requested information from Beijing.

Under international law, national governments are required to respond to such requests from the WHO within 24-48 hours of receiving them. Beijing waited the full 48 hours – until January 3 – before telling the WHO that there had been 44 cases and no deaths.⁹³⁸ WHO public reporting on the matter was vague, opting for the passive voice (“was informed of cases of pneumonia” without saying informed by whom, or the medium by which they were informed).⁹³⁹ In a report dated January 5, the WHO repeated the dubious claims of the December 31 Wuhan Municipal Health Commission’s public notice that “the causal agent has not yet been identified or confirmed,” and that “no evidence of significant human-to-human transmission and no health care worker infections have been reported.”⁹⁴⁰

JANUARY 2020: WIV HOLDS MEETING ON SAFETY, SECURITY, AND RECORD KEEPING

On January 3, the WIV held a work meeting on safety, security, and record-keeping that was attended by over 60 leaders of the WIV, including department heads, research team leads, and safety personnel.⁹⁴¹ One WIV official opened the meeting by “analyzing the existing difficulties and problems that the institute has had with safety and records management processes, putting forth measures to solve them, and outlining the deployment arrangements for related work in 2020.”⁹⁴² He Changcai, the deputy secretary-general of the WIV CCP committee, urged those present to “ensure safety without accidents” in 2020, noting that it was “vitally important to do a good job with safety and record-keeping work throughout the entire year.”⁹⁴³

The summary of He's comments are worth quoting at length:

You must fully comprehend the arduous, complicated, sudden, and long-lasting nature of safety work, go a step further to strengthen safety awareness, your sense of responsibility and [your] sense of crisis, [and] at no time whatsoever can you treat safety work lightly. You must go a step further to strengthen the implementation of responsibilities, strengthen the rectification of hidden safety dangers, strengthen the management of the use of hazardous chemicals, being cautious and conscientious, fulfilling one's duties and responsibilities to do a good job with safety for each work project.⁹⁴⁴

He concluded by emphasizing the importance of record-keeping: "Strictly carry out the related rules of the state, the CAS, and the institute, and as you complete the work of collection, collation, and transfer of department records, guaranteeing both the quality and quantity [of reports] and doing so on time."⁹⁴⁵

JANUARY 2020: WUHAN AUTHORITIES AGAIN DENY TRANSMISSIBILITY OF PNEUMONIA

On January 3, the Wuhan Municipal Health Commission released a statement reiterating its claim of December 31 that it had no evidence that showed the pneumonia outbreak was transmissible between people: "As of now, preliminary investigations have shown no clear evidence of human-to-human transmission and no medical staff infections."⁹⁴⁶ On January 5, the Wuhan Municipal Health Commission released another update in which it stated that "preliminary investigations have shown no clear evidence of human-to-human transmission and no medical staff infections."⁹⁴⁷ As discussed above, multiple cases of transmission between family members, including individuals who were never exposed to the market, had been documented by no later than December 10, and Dr. Zhang Jixian had even documented asymptomatic transmission in a family cluster by December 27. These findings had been reported to the Wuhan Municipal Health Commission well in advance of its misleading public statements.

JANUARY 2020: TEARFUL PHONE CALL BETRAYS TRUE SEVERITY OF SITUATION

In early January, George Fu Gao, an epidemiologist and the director-general of the CCDCP, had a series of phone calls with his American counterpart, Dr. Robert Redfield, a virologist and the director of the U.S. Centers for Disease Control and Prevention.

During a conversation on January 4, Gao, a sober man not known for emotional outbursts, “became distraught and started crying after finding ‘a lot of cases’ among individuals who had not been to the wet market,” according to Redfield’s account of the conversation to CNN.⁹⁴⁸

Redfield also implied that leaders inside the CCP and PRC government had not given Gao, their foremost expert of infectious disease, access to the information that would have allowed him to understand the magnitude and severity of the outbreak until those early days of January.⁹⁴⁹ Despite expressing the feeling of being overwhelmed by the situation, Gao rebuffed Redfield’s offers to dispatch U.S. experts to provide technical assistance to combat the outbreak. Gao said he did not have the authority to accept Redfield’s offer, and the CCP leaders who could accept it were unwilling to do so.⁹⁵⁰ That Gao acknowledged many cases with no tie to the Huanan Seafood Market on January 4 further shows that central government officials were aware of person-to-person transmission long before they warned the public of the risks.

JANUARY 2020: WUHAN HOLDS ANNUAL POLITICAL MEETINGS, REPORTS NO NEW CASES

The Wuhan Municipal People’s Government went forward with the two annual meetings of the local legislature and its political advisory body that began on January 6 and concluded on January 10. During this four-day period, the Wuhan Municipal Health Commission issued no updates at all on the outbreak of “pneumonia of unknown cause,” which it had first acknowledged on December 31.⁹⁵¹

JANUARY 2020: XI CHAIRS FIRST POLITBURO STANDING COMMITTEE MEETING ON THE OUTBREAK

Xi Jinping claimed that he chaired a meeting of the Politburo Standing Committee, the CCP’s highest level decision-making body, on January 7, where he “put forth requirements regarding prevention and control work for the novel coronavirus pneumonia epidemic.”⁹⁵² Xi did not make this claim, however, until mid-February after a period of extended absence from the public and coming under criticism for his response to the outbreak. Xi revealed no other details of what transpired or was said at this meeting. January 7 was two days before the authorities indirectly admitted to the public for the first time that the causative agent of the outbreak was a novel coronavirus. This meeting was not reported by state media at the time, and Xi did not refer to the meeting

until a speech on February 3, which itself was not reported to the public until February 15.

JANUARY 2020: XI TELLS THE PARTY TO GUARD AGAINST UNSPECIFIED DANGERS WITHIN THE PARTY

On January 8, the CCP held a national level meeting in Beijing on the theme of “Never Forget Our Original Aspiration and Remember Our Founding Mission.” It was chaired by Politburo Standing Committee Member and Ideology Czar Wang Huning.⁹⁵³ In his remarks to the meeting, delivered just one day after he convened the party’s top seven leaders to discuss the novel coronavirus outbreak, Xi Jinping alluded to serious problems within the CCP that threatened its ability to retain power: “We must resolutely remove whatever factors weaken the Party’s advanced nature and undermine the Party’s purity, and excise all malignant tumors multiplying on the body of the Party.”⁹⁵⁴ Xi added that the CCP should “resolutely guard against all dangers that run counter to our original aspiration and mission [of the Party] and shake its foundation.”⁹⁵⁵

JANUARY 2020: WSJ STORY FORCES ADMISSION OF CAUSATIVE AGENT AFTER WEEKS-LONG DELAY

On January 9 at 9:45 AM local time, the PRC state-run media first reported to the public that a “preliminary assessment” had indicated that the outbreak of pneumonia in Wuhan was caused by a novel coronavirus.⁹⁵⁶ As indicated by the use of a qualifier like “preliminary assessment,” the authorities had not yet allowed for a full and complete admission of the seriousness of the situation at hand, and this partial admission did not amount to a clear and unambiguous official statement that a pathogen of pandemic potential was spreading throughout China. The statement did not come directly from the CCDCP,⁹⁵⁷ the NHC, or the State Council. Rather it came during a Xinhua interview with Xu Jianguo, a clinical microbiologist who was leading an assessment team advising the central government.⁹⁵⁸

In what may have been an attempt to conceal the delay in disclosing the causative agent, Xu claimed that the full genome of the novel coronavirus was not sequenced until 9:00 PM on January 7.⁹⁵⁹ A subsequent investigative report, however, found that Wuhan authorities had laboratory confirmation of a novel coronavirus no later than December 27.⁹⁶⁰ That amounts to at least a two-week delay in public disclosure of critically important information. For further corroboration, we note that the Wuhan Municipal

CDCP had already determined the outbreak was caused by a novel coronavirus when it first contacted the WIV on December 30, according to Shi Zhengli,⁹⁶¹ and the WIV had “confirmed the full sequence of the genome of the novel coronavirus” by January 2 and isolated it by January 5, according to a WIV report.⁹⁶² The head of the Jinyintan Hospital in Wuhan reportedly indicated that the authorities had shared the genomic sequence with the WIV even earlier on December 27.⁹⁶³ The CCDCP had also sequenced the genome and established the existence of three distinct strains of the virus by January 3.⁹⁶⁴ By January 5, a team in Shanghai led by Zhang Yongzhen had also isolated the virus and fully sequenced its genome, as had the state-run Chinese Academy of Medical Sciences.⁹⁶⁵

Official knowledge that a novel coronavirus was the causative agent of the outbreak predated public disclosure of that information by several days (according to official sources), at least two weeks (based on two investigative reports), and potentially even months (based on information uncovered by this study). The authorities were unquestionably in possession of the genomic sequence before the night of January 7. We suspect that Xu claimed that the genome had not been sequenced until January 7 because that was the date that Xi Jinping chaired a meeting (see above) to decide whether further information would be disclosed. Moreover, on January 8, the WSJ became the first outlet in the world to break the story that Chinese scientists had identified a novel coronavirus,⁹⁶⁶ a development which seems to have forced the PRC authorities to belatedly admit to the causative agent on January 9 (while continuing to discount its pathogenicity and transmissibility).⁹⁶⁷

In the January 9 interview, Xu Jianguo minimized the connection between the novel coronavirus and SARS-CoV-1 that affected China in 2003: “The novel coronavirus that gave rise to this outbreak is different than other known human coronaviruses.”⁹⁶⁸ Xu’s effort to downplay its severity continued in an interview with Science Magazine the next day: “No new patients have appeared, as far as I understand. It’s good news. People fear something like SARS in 2003, but this is a different case. The outbreak is limited, but we should test patients one by one [to identify] pneumonia caused by other pathogens.”⁹⁶⁹ In reality, there is nearly 80 percent similarity at the complete genome level between SARS-CoV-1 and the novel coronavirus from Wuhan,⁹⁷⁰ which one Chinese scientist recognized immediately upon sequencing it on January 5.⁹⁷¹

Even after the admission of the causative agent, PRC authorities continued to deny evidence of human-to-human transmission, including infections among healthcare workers, for nearly another two weeks before finally acknowledging “limited” spread between people on January 20. Beijing also did not share the genomic sequence with the world until January 12, a day after a scientist in Shanghai broke ranks and released the sequence through a colleague in Australia.

JANUARY 2020: AUTHORITIES **CLOSE LAB** THAT RELEASED THE GENOMIC SEQUENCE TO THE WORLD

Much as the PRC authorities did not admit to the public that an outbreak was underway until whistleblower doctors leaked a notice online, the first genomic sequence of SARS-CoV-2 was likewise released to the world by a scientist acting in defiance of the party-state, not by the authorities themselves. On January 3, the same day the NHC gag order came down from Beijing, Professor Zhang Yongzhen of Fudan University received biological samples packed in dry ice in metal boxes and shipped by rail from Wuhan Central Hospital. Professor Zhang's team at the Shanghai Public Health Clinical Center worked around the clock, and by 2:00 AM on the morning of January 5, they had isolated SARS-CoV-2 and sequenced its full genome.⁹⁷²

Zhang's team immediately shared the sequence with the Shanghai Municipal Health Commission and the NHC and sought permission to release it.⁹⁷³ They further warned that the genome indicated it was a contagious respiratory-borne virus and urged preventive measures be taken in public areas.⁹⁷⁴ Zhang reportedly uploaded the sequence to GenBank shortly thereafter, but initially requested that the data remain confidential until July 12.⁹⁷⁵ Zhang had dinner with top public health officials in Wuhan on January 8 to discuss his findings.⁹⁷⁶ On January 11, six days after Zhang shared his findings with the authorities, Zhang's research partner in Australia, Edward Holmes, called Zhang and urged him to publish the sequence.⁹⁷⁷ Zhang thought it over for a few minutes and called Holmes back to tell him to release the genomic sequence on the open platform Virological.org. Zhang then contacted GenBank to lift the embargo on January 12.⁹⁷⁸ Zhang was en route to Beijing at the time.⁹⁷⁹ One day later, the authorities closed Zhang's lab for "rectification,"⁹⁸⁰ and it remained closed at the end of February,⁹⁸¹ but it was eventually allowed to reopen.

JANUARY 2020: NHC CONTINUES TO DENY PERSON-TO-PERSON TRANSMISSION

On January 11, the same day that Zhang Yongzhen released the genomic sequence of SARS-CoV-2 to the world, the NHC released a report titled “Notification of Wuhan Municipal Health Commission on Unexplained Viral Pneumonia.”⁹⁸² Not only was it incorrect to characterize the viral pneumonia as “unexplained” after Zhang had shared the genomic sequence for SARS-CoV-2 with the NHC on January 5, and the NHC’s own sub-agency the CCDCP had sequenced it in full on January 3, the NHC report continued to deny the occurrence of human-to-human transmission: “All 739 close contacts, including 419 medical staff, have been under medical observation and no relevant cases have been found.... [N]o clear evidence of human to human transmission has been found.”⁹⁸³ On the same day, the Wuhan Municipal Health Commission issued a Q&A factsheet claiming that “most of the unexplained viral pneumonia cases in Wuhan this time have a history of exposure to the South China seafood market. No clear evidence of human-to-human transmission has been found.”⁹⁸⁴

JANUARY 2020: BEIJING SHARES GENOMIC SEQUENCE WITH WHO AFTER SCIENTIST PUBLISHES IT

On January 12, the NHC belatedly shared the genomic sequence with the WHO – one day after Zhang Yongzhen’s team at Fudan University published the sequence without authorization through a research partner in Australia. Even under these circumstances, Beijing stalled for at least two more weeks before providing the WHO with detailed data on patients and cases.⁹⁸⁵ Beijing’s delay in sharing the genomic sequence with the WHO stymied recognition of the rapid spread of the coronavirus to other countries, along with the development of tests, drugs, and vaccines. By one estimate, the outbreak spread by a factor of 100-200 times as a result of this delay.⁹⁸⁶

JANUARY 2020: HUBEI HOLDS ANNUAL POLITICAL MEETINGS, SUPPRESSES REPORTS OF NEW CASES

The Hubei Provincial People’s Government, the capital of which is the city of Wuhan, went forward with two annual meetings of the provincial legislature and its political advisory body that began on January 11 and concluded on January 17. The Wuhan Municipal Health Commission started issuing updates on the pneumonia outbreak on January 12, but between that day and January 17, the commission denied that any new cases of the novel coronavirus had been reported anywhere in the city.⁹⁸⁷ According to

an internal report written by a Chinese media outlet exclusively for the relevant central authorities, the local authorities in Wuhan, especially between January 12-17, “willfully chose not to carry out epidemiological surveys, make arrangements to confirm cases, or order any quarantine measures to address the continuously rising suspected cases of novel coronavirus patients.”⁹⁸⁸

For nearly two full weeks, as the Hubei provincial and Wuhan municipal governments held their annual meetings, Wuhan authorities reported no new infections, and officials silenced doctors who warned that cases were mounting.⁹⁸⁹ Meanwhile, one doctor described the terrible scene at his hospital in Wuhan during this time period: “The outpatient section of our hospital was overflowing with a large number of suspected cases that could not be admitted to the hospital, one patient was on his knees pleading with doctors to admit him for treatment, and some patients with serious infections didn’t even have the strength to climb on to the table to take a CT scan. They would just topple over.”⁹⁹⁰

JANUARY 2020: NEIGHBORING COUNTRIES CONFIRM CASES AS CHINA DENIES TRANSMISSIBILITY

On January 13, Thailand’s Ministry of Public Health reported that a 61-year-old Chinese woman arriving at the airport in Bangkok had tested positive for the novel coronavirus. She had not visited the Huanan Seafood Market in Wuhan where the authorities suggested the outbreak began, but she had visited a different market where live animals may have been on sale. Four days later, the Thai ministry announced that a 74-year-old Chinese woman had been quarantined on arrival in the country and had tested positive.⁹⁹¹ On January 15, Japan’s Ministry of Health announced that a Japanese man in his thirties who had been to Wuhan tested positive for the virus on his return to Japan.⁹⁹² Japan’s Health Ministry said the patient had not visited any markets in China, adding that “it is possible that the patient had close contact with an unknown patient with lung inflammation while in China.”⁹⁹³ On January 19, South Korea identified its first confirmed case: a 35-year-old Chinese woman who flew from Wuhan to Seoul and was isolated on entry into the country because of her symptoms, including a high fever.⁹⁹⁴

JANUARY 2020: NHC HOLDS CONFIDENTIAL CALL TO TELL OFFICIALS ABOUT SEVERITY OF OUTBREAK

On January 14, Ma Xiaowei, the minister in charge of the NHC, held a confidential national teleconference with officials to convey instructions on responding to the coronavirus from Xi Jinping, Premier Li Keqiang, and Vice Premier Sun Chunlan. A confidential memo on the teleconference obtained by the Associated Press included a section titled “sober understanding of the situation,” in which the government conceded that “clustered cases suggest that human-to-human transmission is possible,” an important finding that Beijing would not share with the public for another six days, and for which they had evidence as early as December 27.⁹⁹⁵

The memo singled out the case in Thailand, noting that the spread of the virus abroad had fundamentally changed the situation from Beijing’s perspective. The memo further warned: “With the coming of the Spring Festival, many people will be traveling, and the risk of transmission and spread is high. All localities must prepare for and respond to the epidemic.” Ma warned officials the novel coronavirus would present the “most severe challenge since SARS.”⁹⁹⁶ The NHC also distributed a 63-page set of instructions to provincial health officials. The instructions ordered health officials nationwide to identify suspected cases, ordered hospitals to open fever clinics, and required doctors and nurses to wear protective gear. These instructions were marked “internal,” “not to be spread on the internet,” “not to be publicly disclosed.”⁹⁹⁷

JANUARY 2020: WUHAN AUTHORITIES AGAIN DENY PERSON-TO-PERSON TRANSMISSIBILITY

On January 14, the same day that the NHC held a confidential meeting to discuss the “most severe challenge since SARS,” the Wuhan Municipal Health Commission released a public statement claiming: “Among the close contacts [of patients diagnosed with the novel coronavirus], no related cases were found.”⁹⁹⁸ As discussed above, multiple cases of transmission between family members, including individuals who were never exposed to the market, had been documented by no later than December 10, and Dr. Zhang Jixian had even documented asymptomatic transmission in a family cluster by December 27. These findings had been reported to the Wuhan Municipal Health Commission well in advance of this misleading public statement.

By January 12, Beijing, Shanghai, and Shenzhen municipalities, which span from northern China to eastern China to southern China, had all reported to the NHC confirmed cases of patients who had no history of exposure to the Hainan Seafood

Market in Wuhan – further evidence indicating that the virus was spreading from person-to-person – but PRC authorities would not admit to this fact until January 20.⁹⁹⁹

JANUARY 2020: LEVEL-ONE EMERGENCY DECLARED INTERNALLY, PUBLIC TOLD RISK IS LOW

On January 15, in response to the NHC national teleconference, the CCDCP in Beijing declared the highest-level emergency response (Level One) and initiated related response measures. It assigned top public health officials to 14 working groups tasked with obtaining funds, training health workers, collecting data, conducting field investigations and supervising laboratories, according to an internal CCDCP notice obtained by the Associated Press.¹⁰⁰⁰ Xi Jinping was likely involved in the decision to declare a level-one emergency response, as he later cited this decision as an example of his leadership in the epidemic response.¹⁰⁰¹ On the same day that the CCDCP mobilized an emergency response internally, Li Qun, the head of the CCDCP's emergency response center, told an evening news program on state-run CCTV: "We have reached the latest understanding that the risk of sustained human-to-human transmission is low."¹⁰⁰²

JANUARY 2020: NHC ISSUES CASE DEFINITION THAT COMPLICATES CONFIRMATION OF NEW CASES

On January 15, the NHC issued its first case definition for the novel coronavirus to guide medical professionals and local officials in their diagnosis and reporting of cases. The criteria were unusually complex, narrowly defined, and seemingly designed to exclude all but the most severe cases that had clear epidemiological links to Wuhan. For example, to meet the initial guidelines for a "clinical diagnosis," a patient must have had direct exposure to a Wuhan wet market, or at least travelled to Wuhan, within two weeks of the onset of illness. In addition, the patient must have displayed all of the following four clinical conditions: 1) fever, 2) pneumonia confirmed by chest radiograph, 3) reduced or normal white blood cell count, or reduced lymphocyte count during the early stage of the illness, and 4) a lack of significant symptomatic improvement or deterioration after three days of undergoing standard antibiotic treatments. Finally, to qualify as a fully "confirmed case," all of the above criteria for clinical diagnosis must have been met as well as the criterion of laboratory testing of respiratory specimens (whole genome sequencing) showing high homology with the novel coronavirus.¹⁰⁰³

Considering the fact that PCR testing for the novel coronavirus had been developed by this time and was already in use in China,¹⁰⁰⁴ it is curious that the NHC initially required the much more laborious standard of full genome sequencing to confirm a case rather than a positive PCR test. It is possible that full genome sequencing may have been the earliest standard imposed by health authorities starting in late December. One team of researchers searched without success to find the earliest case definition that was in use prior to January 15.¹⁰⁰⁵ On January 18, the NHC issued what would become the first of six revisions to the case definition it would make over the course of a month and a half, and added PCR testing as a means of confirming a case.¹⁰⁰⁶

PCR tests were reportedly in extremely short supply throughout January, and yet hospitals in Wuhan were said to be denying admission to patients without a positive test result. Moreover, the NHC and CCDCP authorized the use of test kits made by only three relatively unknown Shanghai companies that the Associated Press later discovered had paid senior CCDCP officials for the distribution rights in what may have been a case of corruption.¹⁰⁰⁷ While the authorized tests frequently produced false negatives or inconclusive results, the CCDCP and the NHC reportedly tried to prevent scientists and other companies from testing for the virus using kits that they had independently produced.

In another departure from past practice during at least two previous epidemics, the NHC told Wuhan hospitals to send virus samples to central labs under its authority, which, among other things, hampered the independent development of PCR tests.¹⁰⁰⁸ It appears that only four state-run laboratories were authorized to confirm an infection during this time period: the CCDCP, the WIV, the PLA AMMS, and the Chinese Academy of Medical Science.¹⁰⁰⁹ It is likely that such controls on which institutions could confirm a case and develop PCR testing contributed to not a single new case being reported by PRC authorities between January 5 and 17, even though retrospective infection data shows that at least hundreds were infected during this time.¹⁰¹⁰

JANUARY 2020: JAPAN POINTS TO VIRUS TRANSMISSIBILITY WHILE WUHAN DENIES IT

On January 15, the same day that Japan's Health Ministry told the world that the first patient in Japan likely contracted the coronavirus from an infected person in China,¹⁰¹¹ the Wuhan Municipal Health Commission began to sing a slightly different tune. The commission issued the following statement: "Existing survey results show that clear

human-to-human evidence has not been found, and the possibility of limited human-to-human transmission cannot be ruled out, but the risk of continued human-to-human transmission is low.” On January 16, the commission put out a statement that once again discounted the possibility of human-to-human transmission, repeating verbatim the denial of January 14: “Among the close contacts [of patients diagnosed with the novel coronavirus], no related cases were found.”¹⁰¹² On January 17, the commission issued its daily update with yet another denial of transmissibility: “A total of 763 close contacts have been tracked, 665 medical observations have been lifted, and 98 people are still receiving medical observations. Among the close contacts, no related cases were found.”¹⁰¹³

JANUARY 2020: BEIJING CONTINUES REFRAIN THAT VIRUS IS “PREVENTABLE AND CONTROLLABLE”

On January 18, the CCDCP issued statements on its official website and social media accounts warning the public against paying heed to “rumors,” reiterating that the outbreak was “preventable and controllable,” denying that cases at hospitals outside of Wuhan had been concealed, and insisting (incorrectly) that no cases of the disease had appeared in hospitals outside of Wuhan.¹⁰¹⁴ Such misleading statements were made three days after the CCDCP declared internally that a level-one emergency was underway. On January 19, officials at the NHC continued to tell the public that the virus was “preventable and controllable,”¹⁰¹⁵ a refrain that they had repeated ad nauseam since the initial announcement of the outbreak in Wuhan on December 31.

This statement was made five days after NHC Minister Ma Xiaowei told NHC officials in a confidential setting that they faced “the most severe challenge since SARS,” and just one day before the authorities belatedly admitted to person-to-person spread. The Wuhan Municipal Health Commission explained the prolonged denial of person-to-person transmission by citing the hundreds of people who apparently came into close contact with diagnosed patients who did not fall ill,¹⁰¹⁶ but Dr. Zhang Jixian reported clear clinical evidence that asymptomatic infection was occurring within family clusters to the same commission as early as December 27. PRC officials continued to repeat the factually incorrect talking point that the virus was “preventable and controllable” even after person-to-person transmissibility was officially acknowledged. The PRC ambassador to Britain, for example, told BBC News on February 8 that COVID-19 “is controllable, is preventable, is curable.”¹⁰¹⁷

JANUARY 2020: MASSIVE BANQUET HELD IN WUHAN WHILE OUTBREAK RAGES

On January 18, officials in Jiang'an District of Wuhan allowed a massive Lunar New Year banquet to go forward in the community of Baibuting without warning residents of the risk of contracting the novel coronavirus. An estimated 40,000 families participated in the dinner celebration.¹⁰¹⁸ This event was held just two days before the central authorities would finally admit to person-to-person transmission and less than five days before the entire city would be placed under the strictest lockdown the world had ever seen. Nearly a month after the event was held, local officials steadfastly refused to release figures of confirmed or suspected cases of the novel coronavirus infections in the Baibuting area, leaving residents in the dark about the severity of the outbreak in their community.¹⁰¹⁹

JANUARY 2020: XI JINPING ISSUES EPIDEMIC RESPONSE ORDER

On January 20, Xi Jinping issued a written order detailing how officials nationwide should respond to the novel coronavirus epidemic. This action was not reported at the time, and the details of this order have never been published. We know of this order because Xi himself mentioned it during a speech on February 3, which itself was not reported until February 15. Xi reportedly said the following to the Politburo Standing Committee on February 3: "On January 20, I issued special written instructions on epidemic prevention and control work, pointing out that [officials] must place a high degree of importance on the epidemic and do their utmost to complete prevention and control work, and requiring party committees, governments, and relevant departments at every level to place top priority on the people's health and safety, adopt practical and effective measures, and resolutely contain the spread of the epidemic."¹⁰²⁰

JANUARY 2020: BELATED ADMISSION OF PERSON-TO-PERSON SPREAD, DOCTORS/NURSES INFECTED

On January 20 at 11:17 PM local time, the official Xinhua News Agency ran an interview with Dr. Zhong Nanshan in which he became the first PRC official to acknowledge that SARS-CoV-2 was infectious and spreading between people, confirming two cases of individuals in Guangzhou municipality in southern China who had not travelled to Wuhan, but had been infected by family members who had visited Wuhan. Zhong also acknowledged for the first time that infections among medical personnel had occurred.¹⁰²¹ Zhong is an octogenarian respiratory disease specialist who became a

household name in China during the SARS epidemic and came out of retirement to advise the NHC on its response to COVID-19.¹⁰²² With the genomic sequence released on January 11, and PCR testing being developed rapidly by many countries, it was likely clear to the NHC that continued denial of human-to-human transmission would become unsustainable once other countries began to test on a scale large enough to demonstrate that the virus was clearly transmitting very efficiently between people.

Despite the belated admission of person-to-person transmission, Zhong continued to maintain other falsities with their genesis in late December. He downplayed the severity of the situation, calling it a “localized outbreak” in Wuhan, and made no mention of asymptomatic spread.¹⁰²³ Zhong “expressed confidence” that the outbreak could be controlled, and suggested that the new coronavirus was not as dangerous as SARS-CoV-1 when, in fact, it was much more transmissible: “I do not believe this virus will cause the social impact and economic losses as SARS did 17 years ago.”¹⁰²⁴ The truth was cases were being confirmed elsewhere in China and in neighboring countries. Wuhan’s hospitals were already overwhelmed with patients, and the authorities would impose a lockdown on the city just three days later, the likes of which were never seen during SARS in Wuhan or anywhere else in China.

Zhong’s sugarcoating of the situation in public comments did not reflect the government’s internal discussions, as documented in the discussion above of the national teleconference held by NHC Minister Ma Xiaowei on January 14.¹⁰²⁵ Zhong also continued to imply that the virus originated at the seafood market in Wuhan.¹⁰²⁶ In a separate interview with CCTV on January 20, Zhong said the source of the coronavirus was “basically unclear,” but claimed that various epidemiological investigations suggested that it spilled over from wild animals.¹⁰²⁷ The fact was a significant minority of the earliest documented cases had no link at all to the market,¹⁰²⁸ suggesting from the very beginning that human-to-human transmission was occurring (including between the earliest acknowledged patient and his spouse) and that the market was most likely a site of amplification rather than the site of spillover, according to epidemiologists consulted by Senator Rubio’s staff.

The belated admission of person-to-person spread occurred on the same day that Xi Jinping issued “special written instructions” on the epidemic response, and given what is known about Xi’s penchant for micromanagement and his own claims about

personally issuing the order to lock down Wuhan, the common timing suggests that Xi personally made the decision to disclose the fact of person-to-person transmission, which would soon become apparent to the rest of the world. Earlier in the day on January 20, the Wuhan Municipal Health Commission had released its daily report in which it once again declared that “no related cases were found among the close contacts.”¹⁰²⁹ Less than three full days later, a city with a government that had repeatedly told its residents that there were no cases of person-to-person spread of the novel coronavirus would implement a strict lockdown because its medical system was in crisis.

JANUARY 2020: WIV PAPER OMITS RELEVANT FACTS ABOUT SARS-COV-2 RELATIVE “RATG13”

On January 20, the same day that the PRC authorities belatedly acknowledged that the novel coronavirus was spreading from person-to-person, Shi Zhengli’s research team at the WIV submitted for review their first paper on SARS-CoV-2, titled “A Pneumonia Outbreak Associated with a New Coronavirus of Probable Bat Origin,” which the prestigious journal Nature published online on February 3.¹⁰³⁰ Shi and her colleagues reported assembling a full genome sequence of the novel coronavirus, and noted a 79.6 percent match between SARS-CoV-2 and the coronavirus that caused the SARS epidemic in 2002 to 2003. They further confirmed that SARS-CoV-2 uses the same cell entry receptor—angiotensin converting enzyme II (ACE2)—as SARS-CoV-1.¹⁰³¹

It was another finding in Shi’s paper that would soon raise eyebrows and call into question whether the WIV was sharing everything that it knew about the novel coronavirus. Shi’s team referenced a match between part of the SARS-CoV-2 virus and the genome of another bat coronavirus that they called RaTG13. Shi’s team claimed: “We then found that a short region of RNA-dependent RNA polymerase (RdRp) from a bat coronavirus (BatCoV RaTG13)—which was previously detected in *Rhinolophus affinis* from Yunnan province—showed high sequence identity to 2019-nCoV.”¹⁰³² Surprisingly for a scientific paper, no citation was given to support or further explain this important claim.¹⁰³³ Full-length sequencing of RaTG13 found an overall 96.2 percent genome match to SARS-CoV-2, according to Shi’s team.¹⁰³⁴

The peculiarities did not stop with a missing citation. The WIV failed to disclose that RaTG13, which it claimed to be the closest known relative of SARS-CoV-2, was not a newly discovered virus, but rather a virus called BtCoV/4991, which had been in the

lab's possession since 2013. The WIV published research on BtCoV/4991 in 2016 and sequenced its full genome in 2018.¹⁰³⁵ Why did Shi and her colleagues neglect to inform their readers that the newly renamed RaTG13 was actually BtCoV/4991? How often do senior scientists like Shi, whose funding depends in part on recognition of their publishing records, forget to remind readers of their previously published papers that are directly relevant to their newest work? Are we to believe that Shi simply forgot about her 2016 paper or failed to appreciate its relevance? Why did Shi's team also leave out other important details, such as the name and exact location of the mine where the sample from bats had been collected in 2013? Why wouldn't Shi mention that RaTG13 was sampled from the same mine where three people had died of a respiratory illness of unexplained origin?¹⁰³⁶ Was this sloppy science or obfuscation?

Some scientists found the missing information puzzling. "I would expect people to be as clear as they can be about the history of the isolates of their sequencing," Professor Wendy Barclay, head of Imperial College London's infectious disease department, told the Sunday Times, "Most of us would have reported the entire history of the isolate, [back] to where all that came from, at the time."¹⁰³⁷ Nikolai Petrovsky, a senior virologist at Flinders University in Australia, said it was "simply not credible" that the WIV would have failed to conduct further analysis on RaTG13 (BtCoV/4991) given the fact that the virus could have been linked to the deaths of three individuals; identifying pathogens of pandemic potential before an outbreak occurs was, after all, the *raison d'etre* for Shi's extensive work in pathogen discovery.¹⁰³⁸

Peter Daszak of the EcoHealth Alliance, a longtime WIV collaborator who resorted to a variety of shenanigans to squelch discussion of the lab leak theory once the pandemic began,¹⁰³⁹ gave at least three interviews in which he claimed that the WIV had not fully sequenced the sample until January 2020 when its similarity to SARS-CoV-2 was noticed and it was pulled out of a freezer for closer examination. Daszak told Wired in February 2020, "At the time [it was originally collected], we were looking for Sars-related viruses, and this one was 20 percent different. We thought it's interesting, but not high-risk. So we didn't do anything about it and put it in the freezer."¹⁰⁴⁰ He repeated the same story to the New York Times Magazine in April.¹⁰⁴¹ In July, Daszak told the Sunday Times that there was no significance in the renaming (and the failure to disclose the renaming) and called those who raised questions about the matter "the conspiracy folks."¹⁰⁴²

Daszak further claimed that the WIV's sole sample of RaTG13 was depleted during the January 2020 sequencing process, rendering further analysis impossible.¹⁰⁴³ But Daszak's claimed timeline did not comport with the facts. When the WIV finally uploaded the raw data underlying the RaTG13 genome sequence to the GenBank database in May 2020, its date stamps revealed that its various parts had been sequenced in 2017 and 2018, which one molecular biologist remarked "makes it all the more puzzling that the WIV scientists first fixated on the underwhelming 79.6 percent similarity to a SARS virus, rather than the whopping 96.2 percent similarity to a complete bat virus genome that was already in their database."¹⁰⁴⁴ While Shi Zhengli eventually admitted in July 2020 that her group had, in fact, sequenced the full genome of RaTG13 in 2018, she still denied that her team had ever isolated or cultured the virus,¹⁰⁴⁵ and she has never explained why neither the fact of RaTG13's earlier sequencing, nor its possible links to the deaths in the Mojiang mine in 2013, were not noted in the Nature paper.

The fact that RaTG13 was simply an alias for BtCoV/4991 may have never been uncovered were it not for the investigative efforts of a microbiologist in Austria and a science-minded Internet sleuth in India.¹⁰⁴⁶ Two others who played an important role in unraveling the mystery of RaTG13, molecular biologist Alina Chan and science writer Matt Ridley, are worth quoting here at length to underscore the oddity of this whole episode:

To summarise, an outbreak of mysterious pneumonia in a copper mine, more than 1,800 kilometres by road from Wuhan, led to patient samples being sent to Wuhan for analysis. A 2013 medical thesis concluded, after incorporating results shared by the WIV, that these miners had likely been infected by a SARS-like coronavirus from bats in the mine. An expedition by Wuhan virologists to seek the viral cause brought back hundreds of samples from bats. Their repeated visits to the mine turned up a bat-borne coronavirus in 2013, which was recognised to be a novel SARS-like coronavirus. The WIV team partly sequenced this new virus in 2017 and then fully sequenced it in 2018. When its sequence was found to closely match the sequence of the virus causing Covid-19, the Wuhan scientists published it under a new name and failed to cite their own paper detailing its discovery or to reveal that they had been studying the virus over the past few years

or to mention that it had come from a mine where there had been a fatal outbreak of pneumonia.¹⁰⁴⁷

JANUARY 2020: THE WHO VISITS WUHAN

On January 20-21, a delegation from the WHO conducted what they called a “field visit” to Wuhan just two days before Xi Jinping placed the city under strict lockdown. The delegation was allowed to visit the Wuhan Tianhe International Airport, Zhongnan Hospital, and the Hubei Provincial CDCP, including its BSL-3 laboratory.¹⁰⁴⁸ It does not appear that the origin of SARS-CoV-2 was a topic of inquiry. There is no public record suggesting that the delegation visited the WIV or the Huanan Seafood Market. The delegation focused instead on the public health response, including discussions regarding “active surveillance processes, temperature screening at the airport, laboratory facilities, infection prevention and control measures at the hospital and its associated fever clinics, and the deployment of the rRT-PCR test kit to detect the virus.”¹⁰⁴⁹

In its public readout of the visit released on January 22, the WHO was laudatory of Beijing’s response to the outbreak and closely echoed Beijing’s severely understated talking points as articulated by Zhong Nanshan on January 20. The WHO simply told the world: “Data collected through detailed epidemiological investigation and through the deployment of the new test kit nationally suggests that human-to-human transmission is taking place in Wuhan. More analysis of the epidemiological data is needed to understand the full extent of human-to-human transmission.”¹⁰⁵⁰

JANUARY 2020: XI JINPING ORDERS TOTAL LOCKDOWN OF WUHAN AND HUBEI

On January 22, just two days after Beijing admitted that person-to-person transmission of the virus was occurring, Xi Jinping ordered a lockdown of Wuhan in order to “comprehensively and strictly control the outflow of people” from Hubei Province.¹⁰⁵¹ At 2:00 AM local time on January 23, the Wuhan Municipal People’s Government sent out text messages to smartphones around the city announcing that the airport, train, and bus stations would be closed by 10:00 AM.¹⁰⁵² The entire city of Wuhan was placed under a lockdown by the end of the day that was unprecedented in its strictness and scope, and expanded to the entire province within days. The restrictions were not lifted until April 8.¹⁰⁵³

JANUARY 2020: BEIJING ISSUES SECOND EDITION OF LABORATORY SAFETY GUIDELINES FOR NEW VIRUS

On January 23, the same day that the lockdown began in Wuhan and only three days after the central authorities admitted to person-to-person transmission, the NHC issued the second edition of a nationwide directive titled “Laboratory Biosafety Guidelines for the Novel Coronavirus.”¹⁰⁵⁴ While the text of the second edition is available online, the text of the first edition is not. In fact, no public references to the directive exist prior to January 23. This absence suggests that the original may have had a more limited distribution and was likely issued before the authorities publicly acknowledged the causative agent of the pneumonia outbreak was a coronavirus on January 9.

Whatever the reason may be for the missing first edition, the second edition clearly shows that the central authorities were concerned about coronavirus infections occurring as a result of researchers around the country working with samples in laboratory settings. Beijing’s awareness of the biosafety risks posed by this virus stands in stark contrast to the vehement denials that a laboratory acquired infection could be a plausible explanation for how the outbreak began – the position that PRC authorities (and others) have regularly taken in international settings since February 2020.

The NHC described the purpose of the guidelines thusly: “In order to ensure laboratory biosafety during the period of prevention and control work for the pneumonia caused by novel coronavirus infection, the National Health Commission organized the formulation of laboratory biosafety guidelines for the novel coronavirus to direct localities to standardize experimental activities related to the novel coronavirus.”¹⁰⁵⁵ The directive focused first and foremost on the risks associated with virus cultivation, requiring laboratories to seek authorization from NHC before carrying out projects involving virus cultivation:

Virus cultivation...refers to operations such as virus isolation, culture, titration, neutralization testing, purification of live viruses and their proteins, freeze-drying of viruses, and recombination experiments to produce live viruses. The above operations should be carried out in a Biosafety Level-3 laboratory. Use virus culture to extract nucleic acid. The addition of a lysing agent or an inactivating agent must be carried out under the same laboratory biosafety level and protective conditions as virus cultivation.... Before a laboratory carries out related activities,

it shall seek the approval of the National Health Commission and obtain the credentials to carry out the corresponding activities.¹⁰⁵⁶

The directive further stipulated that all experiments involving “infecting animals with live viruses, sampling infected animals, processing and testing infectious samples, specialized surveys of infected animals, and the handling of infected animal excrement,” must also be conducted in a Biosafety Level-3 laboratory, and like virus cultivation, pre-authorization and credentialization from the NHC were required.¹⁰⁵⁷ Official concern even extended to lab activities involving uncultured infectious materials and inactivated materials, such as virus antigen detection, serological detection, nucleic acid extraction, biochemical analysis, and the inactivation of clinical samples. Although the guidelines permitted these activities in a BSL-2 setting, it required personnel to use the PPE required for a BSL-3 lab when working with uncultured infectious materials. Only operations that do not involve pathogenic live viruses, such as molecular cloning, could be performed in a BSL-1 laboratory.¹⁰⁵⁸

Two provisions focused on the safe transport of virus samples and the safe management of virus strains and samples. The specter of a lab leak was raised as a specific risk to guard against. “Strains and related samples of the novel coronavirus should be managed by dedicated personnel,” the guidelines stressed, “The source, type, quantity, and registration number of the strains and samples should be accurately recorded, and effective measures should be taken to ensure the safety and security of the strains and samples. Strictly prevent misuse, malicious use, theft, robbery, loss, leakage, and other incidents.”¹⁰⁵⁹

The concern about such biosafety incidents was serious enough to warrant a standalone section in the guidelines on “Handling Laboratory Biosafety Operational Errors and Accidents.”¹⁰⁶⁰ This section provided instructions of a high degree of specificity, suggesting that perhaps they were derived from direct experience. For example, officials were told: “[I]f a strain of the novel coronavirus or other potentially infectious material contaminates the operating table of the biosafety cabinet causing limited contamination: use a disinfectant with an effective chlorine content of 0.55%. The disinfectant needs to be available, ready to use, and applied within 24 hours.”¹⁰⁶¹ The guidelines further added: “To clean up contaminants, strictly abide by the biosafety operation requirements for

live viruses, use steam pressure sterilization to treat [the area], and conduct laboratory ventilation, etc., to prevent secondary hazards.”¹⁰⁶²

The guidelines addressed in detail what to do if a vessel containing a live virus, such as a test tube or vial, was broken or otherwise leaked or spilled:

If a container holding a virus culture is broken or overturned causing a laboratory contamination: seal off the laboratory space to avoid the spread of contaminants and use towels with 0.55% effective chlorine disinfectant to cover the contaminated area. When necessary (if there is a large spill), the laboratory can be heated and fumigated with peracetic acid, the dosage is 2g/m³, and it should be fumigated overnight; or 20g/L of peracetic acid disinfectant can be sprayed with an aerosol sprayer, the dosage is 8ml/m³, and it takes effect within one to two hours; if necessary, use potassium permanganate-formaldehyde fumigation: potassium permanganate should be 8g/m³, place it inside a heat-resistant and corrosion-resistant container (ceramic jar or glass container), then add 10ml/m³ of formaldehyde (40%) and fumigate for four hours or longer. The indoor humidity should be 60%-80% during fumigation.¹⁰⁶³

The proper management of hazardous waste was another major theme of concern. The guidelines started with the basics: 1) labs working on SARS-CoV-2 must put in place rules for waste disposal and operational procedures for waste and sewage treatment, 2) all hazardous waste must be properly labeled and kept in standardized containers, 3) only appropriately trained personnel using the appropriate PPE should handle hazardous waste, and 4) the safe disposal of infectious waste requires understanding the different classifications of biosafety waste and implementing the proper corresponding disposal procedure.¹⁰⁶⁴

The guidelines then gave detailed instructions on the differences between handling liquid waste versus solid waste. First, they distinguished between ordinary sewage and liquid infectious waste. The former is produced by equipment such as handwashing pools and can be discharged into the laboratory water treatment system, but only after “the treatment reaches the standard.”¹⁰⁶⁵ The latter consists of wastewater generated during the course of experiments, which must be treated by chemical or physical disinfection. Lab workers were told to verify that disinfection has completely occurred before final disposal. “The staff shall dispose of waste promptly and must not take waste

materials out of the laboratory zone,” the guidelines warned.¹⁰⁶⁶ The treatment of solid waste received considerably more attention than liquid waste:

1. Solid waste should be collected separately according to classification, and the solid waste collection container should have the properties of being unbreakable, leak-proof, moisture-resistant, heat-resistant, and sealable. Infectious waste in the laboratory is not allowed to be accumulated and stored, and it should be sterilized by pressure steam in a timely manner. Before disposal, waste should be stored in a designated and secured space in the laboratory.¹⁰⁶⁷
2. Small types of solid waste, such as tissue specimens, consumables, personal protective equipment, etc., shall be subjected without exception to pressure steam sterilization treatment, and then removed from the laboratory along the waste channel.¹⁰⁶⁸
3. Bulky solid waste, such as HEPA filters, shall be sterilized in situ by professional personnel, and then placed into secured containers for sterilization. Items that cannot be autoclaved, such as electronic equipment, can be fumigated with an ethylene oxide treatment.¹⁰⁶⁹
4. The solid waste removed from the laboratory after disinfection and sterilization treatments should be collectively handed over to the solid waste treatment work unit for disposal.¹⁰⁷⁰
5. Sharp instruments used during experiments (including needles, knives, metal and glass, etc.) should be directly discarded in a box specifically for sharp instruments, and after they are treated in the autoclave, then finish with the standard disposal.¹⁰⁷¹
6. Establish waste treatment records: regularly inspect the laboratory exhaust HEPA filters for leaks and replace them when needed, regularly monitor and test the treated sewage, and use biological indicators to monitor and test the effectiveness of pressure steam sterilization.¹⁰⁷²

The issues that these guidelines sought to address corresponded closely to problems that were observed at the WIV in 2018-2019: everything from questions about the proper BSL level for working with live pathogens and when conducting animal challenge experiments to concerns about hazardous waste management and preventing leaks that occur when virus samples are stored or transported improperly. Some of the language contained in the guidelines, such as the injunction to "strictly prevent the misuse, malicious use, theft, robbery, loss, leakage, and other incidents" of viral samples, is similar to WIV reporting about the risk of "operational errors" in November 2019.¹⁰⁷³ The proper storage of viral strains and the correct management of waste from animal experiments were likewise key themes at a mandatory three-day biosafety training held at the WIV in late November 2019, which was administered by senior officials dispatched from Beijing.¹⁰⁷⁴

Readers will recall that the WIV's new campus at Zhengdian Park, which houses its BSL-4 facility, had to hire a contractor for a major renovation of its hazardous waste management system in July 2019.¹⁰⁷⁵ The focus of the guidelines on the proper handling of infectious and hazardous materials and the need for better record keeping with regard to waste treatment provides a detailed treatment of themes touched on more generally at a biosafety meeting held at the WIV on January 3, 2020.¹⁰⁷⁶ Finally, it is important to note that Shi Zhengli and her team at the WIV conducted much of their work with SARS-like coronaviruses in BSL-2 laboratories rather than at the BSL-3 level required by these guidelines,¹⁰⁷⁷ a fact which may account for the guidelines' emphasis on restricting work with SARS-CoV-2 to BSL-3 facilities.

JANUARY 2020: HONG KONG, NOT BEIJING, FIRST TO CONFIRM ASYMPTOMATIC SPREAD

On January 24, a team of doctors and researchers from Hong Kong published a piece in the *Lancet* that documented for the first time that SARS-CoV-2 was spreading asymptotically.¹⁰⁷⁸ The team was able to draw this conclusion based on their observation and treatment of a family of six patients, starting on January 10, who had travelled to Wuhan between December 29 and January 4. Five of the six family members tested positive for SARS-CoV-2 infection, including one 10-year-old child who was asymptomatic, but displayed radiological ground-glass lung opacities. None of the family members had contact with any markets or animals while in Wuhan, though two visited a hospital.¹⁰⁷⁹

Despite this evidence, PRC authorities continued to discount asymptomatic transmission, and Beijing's resistance to acknowledging the role played by asymptomatic transmission was, with great consequence, echoed elsewhere as other countries began to confront the pandemic.¹⁰⁸⁰ One recent study estimated that more than one-third of SARS-CoV-2 infections are asymptomatic, and when pre-symptomatic cases are included, silent infections rise to as much as 42.8 percent of all infections.¹⁰⁸¹ Another recent comparison of household studies confirmed that individuals with asymptomatic infections transmitted SARS-CoV-2 to close contacts, although to a somewhat lesser extent than those with symptomatic infections.¹⁰⁸²

JANUARY 2020: STUDY SHOWS 34 PERCENT OF DECEMBER CASES HAD NO EXPOSURE TO THE MARKET

On January 24, a team of 29 Chinese researchers published an epidemiological study in the *Lancet* that examined a sample of 41 hospital patients admitted in Wuhan in December that had been identified as having laboratory-confirmed infection with SARS-CoV-2.¹⁰⁸³ Their findings were significant for a number of reasons, but most importantly for the origins question, the team's data did not support the thesis that the market was the original spillover site and showed that person-to-person transmission was almost certainly occurring from the beginning because three of the four earliest cases in their sample could not be linked to the market.

The earliest known case in their sample to develop symptoms did so on December 1, and that patient had no link to the market. Moreover, no epidemiological link was established between the first patient and later cases. On December 10, three more cases were identified, two of which also had no connection to the market.¹⁰⁸⁴ A total of 41 patients were included in this study, but 14 of the 41 (34 percent), including three of the four earliest cases, had no direct exposure to the Huanan Seafood Market.¹⁰⁸⁵ Another clear sign of person-to-person transmission was the fact that the spouse of the first fatal case, who had no known history of exposure to the market, also developed pneumonia and was hospitalized.¹⁰⁸⁶

JANUARY 2020: XI JINPING CHAIRS HIGH-LEVEL MEETING, DEPLOYS INTERNET CENSORS

On January 25, Xi Jinping chaired a meeting of the Politburo Standing Committee that focused on combatting the novel coronavirus outbreak. Xinhua claimed that several such

meetings had preceded this one, though only one has ever been reported and it had not been at the time of the publication of the Xinhua report. “The meeting,” Xinhua wrote, “emphasized that since the recent pneumonia outbreak [caused by] successive infections of a novel coronavirus in Wuhan Municipality, Hubei Province, and other areas, General Secretary Xi Jinping has placed great importance [on this matter] all along, held numerous meetings, listened to numerous reports, and issued important instructions....”¹⁰⁸⁷

Xi’s concerns were much more expansive than just the public health response. Maintaining the “overall stability of society”¹⁰⁸⁸ and shoring up support for Xi’s leadership of the CCP¹⁰⁸⁹ were prominent themes, and to this end, Xi deployed the party-state’s vast censorship and surveillance apparatus to quell public criticism of Beijing’s response as well as discussion of the origin, scope, and severity of the outbreak. For example, the Politburo Standing Committee meeting ordered the Cyberspace Administration of China (CAC) to “take the epidemic prevention and control work as your top political task at present...[and] use the power of the whole organization and the whole system to do a good job with online propaganda and guidance work [related to] epidemic prevention and control....”¹⁰⁹⁰ The CAC’s goal in curating online content was described in Orwellian terms as “forming unity of will into an impregnable stronghold” by “constructing a favorable atmosphere online.”¹⁰⁹¹

JANUARY 2020: LEADING GROUP REFLECTS CCP’S PRIORITIZATION OF POLITICS ABOVE PUBLIC HEALTH

On January 26, the PRC State Council established a nine-person central leading group to direct the response to the coronavirus epidemic. Premier Li Keqiang chaired it, and the vice chairman was Wang Huning, a member of the Politburo Standing Committee and the CCP’s czar for ideology. Huang Kunming, the head of the CCP Propaganda Department, was also a member of the task force.¹⁰⁹² Sun Chunlan, another member of the leading group, did hold the health portfolio as Vice Premier, but she had no background in science, medicine, or public health, and Sun too had previously worked in mostly political and propaganda roles, including as the former head of the United Front Work Department, a CCP organization tasked with co-opting key groups in society and building support for the CCP.¹⁰⁹³ The presence of Zhao Kezhi, the Minister of Public Security, as a member of the task force further reflected the CCP’s focus on “stability maintenance,” which his ministry is charged with overseeing.¹⁰⁹⁴

Not a single public health leader, such as Ma Xiaowei, the minister in charge of the NHC, and Dr. George Fu Gao, the director-general of the CCDCP, was appointed to the leading group. It consisted entirely of career CCP cadres drawn largely from the propaganda, public security, and stability maintenance systems.¹⁰⁹⁵ The leading group's purely political composition stood in contrast to the task force assembled to respond to the SARS outbreak in 2003, which included two senior health officials, one senior official from the Ministry of Science and Technology, and one senior official responsible for logistics.¹⁰⁹⁶

JANUARY 2020: HUBEI VICE GOVERNOR RETURNS TO THE WIV

On January 26, Xiao Juhua, the vice governor of Hubei Province who “inspected” the WIV’s BSL-4 laboratory campus on December 5, returned to the WIV to investigate its work and direct its R&D efforts to combat the coronavirus epidemic.¹⁰⁹⁷ Xiao conveyed to the WIV the “important instructions” of Xi Jinping to “strengthen the investigation into the origin [of the virus] and etiological testing and analysis, [and] accelerate the research and development of therapeutics and vaccines.”¹⁰⁹⁸ Xiao alluded to a lack of coordination among the various lines of effort underway at the WIV, likely a reference to research that was being conducted by the PLA AMMS alongside the WIV’s own efforts: “She stressed that during the R&D strategic campaign process, matters that require coordination should be conducted according to the principle of ‘one matter, one report,’ [and] ‘special matters [need] special handling,’ promptly turning things around and removing the ‘obstacles’ in order to bring about highly-efficient advancements.”¹⁰⁹⁹

JANUARY 2020: NHC IGNORES ASYMPTOMATIC SPREAD, EXCLUDES POSITIVE PATIENTS FROM COUNT

On January 27, the NHC issued its fourth edition of surveillance guidelines for the novel coronavirus.¹¹⁰⁰ This set of guidelines instructed health officials to only report “confirmed cases” in the national tally of infections, and “confirmed cases” were defined to exclude people who had tested positive for the novel coronavirus but displayed only mild clinical symptoms or no symptoms at all.¹¹⁰¹ In addition to a positive test result, a “confirmed case” had to meet at least one of three epidemiological criteria and at least two of three clinical manifestations of the disease.¹¹⁰² Drawing such a distinction between a “positive diagnosis” and a “confirmed case” stood at odds with WHO guidance, which states that “confirmed cases are those diagnosed with COVID-19 virus

in the laboratory with or without clinical signs and symptoms.”¹¹⁰³ A public health expert interviewed by VOA said he was not aware of any government worldwide that had adopted the PRC’s approach of excluding positive cases that are pre-symptomatic or asymptomatic from confirmed cases counts.¹¹⁰⁴

JANUARY 2020: CHINESE SCIENTISTS TRACE PERSON-TO-PERSON TRANSMISSION TO DECEMBER

On January 29, a large consortium of scientists, including George Fu Gao and many others from the CCDCP, published a paper in the New England Journal of Medicine that analyzed the available epidemiological data from December 2019 and the first part of January 2020. They concluded: “[The number of] cases of Novel coronavirus–infected pneumonia has been doubling in size approximately every 7.4 days in Wuhan at this stage. Human-to-human transmission among close contacts has occurred since the middle of December and spread out gradually within a month after that.”¹¹⁰⁵

JANUARY 2020: FIREBRAND MAOIST ACADEMIC MAKES VEILED CRITICISM OF XI JINPING

On January 30, Peking University Professor Kong Qingdong published a cryptic poem online about the last emperor of the Ming Dynasty, employing a well-known historical incident to imply that the Chinese people were preparing to overthrow Xi Jinping.¹¹⁰⁶ Kong is known as a crass figure with a penchant for stirring controversy, a proponent of Maoism, and a strong supporter of former Politburo Member Bo Xilai, a rival of Xi’s who was sacked in 2012 and sentenced to life in prison in 2013.¹¹⁰⁷

JANUARY 2020: MOST SEEKS TO STOP VISITING FOREIGN SCIENTISTS FROM “SPREADING RUMORS”

On January 31, the MOST issued a nationwide directive to all of the laboratories and educational institutions under its jurisdiction about their responsibilities for the foreign experts visiting China and working under their charge.¹¹⁰⁸ In addition to requiring that basic information about the virus and required prevention measures be shared with foreign scientists in their own languages so that they did not spread the virus to others, the directive told officials how to respond if a foreigner was infected, and made clear that they should ensure that foreign scientists working in China did not access or spread information about the outbreak that was not officially sanctioned. “Effectively guide [foreigners], boost their confidence, use official authoritative channels to launch

propaganda [work], and guide the foreign experts to not believe rumors and not spread rumors.”¹¹⁰⁹

JANUARY-FEBRUARY 2020: XI JINPING **DISAPPEARS** FROM PUBLIC EYE FOR EXTENDED PERIOD

Between January 30 and February 4, CCP and state media outlets did not publish any photos or video of Xi Jinping.¹¹¹⁰ It was a conspicuously long period of absence, as Xi had dominated the daily news for much of his seven plus years in the top position, and it may have reflected internal turmoil over Xi’s response to the outbreak.¹¹¹¹ On February 5, Xinhua reported that Xi met with Cambodian Prime Minister Hun Sen, an event that seemed staged to give the appearance of normalcy.¹¹¹² Aside from this one reported meeting, Xi was absent from state media and the public eye for 12 consecutive days. On February 10, Xi made his first public appearance, visiting the “frontline” of the pandemic response in Beijing’s Chaoyang District, shown by media donning a mask and having his temperature taken.¹¹¹³

JANUARY-FEBRUARY 2020: CHINESE CITIZENS BECOME THE FIRST TO SUSPECT A **LABORATORY ORIGIN**

Speculation about a possible laboratory origin of SARS-CoV-2 began among people in China, not foreign observers, as early as January 2020.¹¹¹⁴ On January 27, Zhang Jinshuo, a bat expert at the CAS Institute of Zoology interviewed by a journalist from the Southern Weekly, cast doubt on the theory that SARS-CoV-2 was transmitted directly from a bat to a human, noting that he had worked with bats on an almost daily basis for 12 years and had never been infected with a coronavirus. The same reporter spoke with Zhou Jiajun, a bat researcher with the Zhejiang Provincial State Forestry Bureau, who noted that bites were common in his line of work, but “no one has yet been infected with an unknown disease” as a result of such bites.¹¹¹⁵

WIV coronavirus expert Shi Zhengli, in a candid moment with a foreign journalist, admitted that her first thought was that the coronavirus could have come from her lab.¹¹¹⁶ Aside from that one interview, however, Shi has stuck to issuing denials that her lab was involved. On February 2, she wrote on the social media platform WeChat: “I, Shi Zhengli, solemnly swear on my life that this has nothing to do with our laboratory,” and added that virus was “nature punishing the human race for keeping uncivilized habits.”¹¹¹⁷

Shortly after Shi's WeChat denial, a person called Dr. Wu Xiaohua posted on social media alleging that the outbreak was due to poor lab management at the WIV. Wu noted that Shi had demonstrated in a 2015 study that she knew how to artificially manipulate coronaviruses, and challenged Shi to answer questions about suspicious features of the SARS-CoV-2 genome.¹¹¹⁸ Wu also posted an article on a popular news site specializing in military and nationalist content that was widely circulated on the Chinese language web, but has since been removed.¹¹¹⁹ Little is known about Wu and she has not posted on Weibo since February 2020.¹¹²⁰ On February 4, Xu Bo, a well-known billionaire entrepreneur who is the founder and chairman of one of China's top mobile game companies, reportedly posted a criticism of the WIV for engineering the virus that started the pandemic on his personal Weibo account.¹¹²¹ Xu's posts reportedly included considerable detail about Shi's history of gain-of-function research with human ACE2 receptors,¹¹²² the cellular entry point exploited by SARS-CoV-2.¹¹²³

FEBRUARY 2020: XI SEEKS TO ADDRESS "SHORTCOMINGS" AND TO "PATCH HOLES THAT LEAK"

On February 3, Xi Jinping addressed a Politburo Standing Committee meeting that was scheduled specifically to address the authorities' response to the coronavirus outbreak. It was held during a period of prolonged absence from the public eye for Xi and not disclosed to the public until Qiushi, the CCP Central Committee's official journal, published Xi's remarks on February 15.¹¹²⁴ Xi focused on four broad areas: 1) key aspects of prevention and control work to address the developing outbreak, 2) maintaining social stability during the epidemic, 3) managing public opinion, and 4) minimizing disruptions to the economy.¹¹²⁵ Xi opened with what felt like a defense of his handling of the outbreak: "From the beginning of the year to the present day, epidemic prevention and control has been the issue that I have followed most closely.... I have constantly tracked the spread of the epidemic and the progress of prevention and control work, and continuously issued oral instructions and written instructions."¹¹²⁶

Invoking China's revolutionary past, Xi Jinping called the epidemic response a "people's war," and stressed that he had ordered a "comprehensive mobilization" of officials across the nation to fight that war.¹¹²⁷ Xi not only defended the timeliness of his response, but also the correctness of his decisions: "All in all, the Central Party's judgments with regard to the epidemic situation have been correct, each work deployment has been timely, and the measures adopted have been effective."¹¹²⁸

To strengthen the case that he had handled the outbreak well, Xi appealed to praise from the international community: “When I met with the WHO Director-General Tedros, Tedros said that the speed of China’s actions and the scale of [our response] was something seldom seen anywhere in the world, [that] these are the advantages of China’s system and the experiences other countries should learn from, [and that he] believed that the measures that China had adopted would effectively control and ultimately defeat the epidemic.”¹¹²⁹

When Xi discussed the key aspects of prevention and control work, the emphasis was on the central authorities directing the response from Beijing and local authorities implementing those directions without question or deviation. “Epidemic prevention and control must uphold [the principle] of coordinating all the activities of the nation like moves in a game of chess,” Xi said, “Party committees and governments at all levels must resolutely obey the unified commands, unified coordination, and unified dispatch...of the Central Party Committee to the point that all orders and prohibitions are strictly enforced.”¹¹³⁰ Xi highlighted “weak links and problems that deserve attention,” and told officials they “must pay close attention to making up for the shortcomings and patching holes that leak.”¹¹³¹ Officials who did not obey his orders would be punished through the CCP’s internal accountability system, Xi warned, and severe cases of malfeasance and dereliction of duty would be criminally prosecuted.¹¹³²

Xi did not overlook the importance of the origin question. “Defeating this disease is inseparable from the support of science and technology,” Xi stressed, “We must scientifically prove the origin of the virus, ascertain the source of infection and the mode of transmission, closely track the mutation of the virus, and promptly research prevention and control tactics and measures.”¹¹³³ Xi recognized the importance of researchers sharing information with each other, but he limited the scope of such exchanges to Chinese researchers only and to information that was not classified: “Relevant data and case materials, except those required to be kept secret by law or regulation, and under the precondition of protecting state security, should be openly shared with the scientific and technological community inside our country, and experts in clinical medicine, epidemiology, and virology should be organized to study the key characteristics of the virus, such as transmissibility and pathogenicity, and come up with practical research results as soon as possible.”¹¹³⁴

Xi Jinping framed the epidemic response in political terms as much as public health terms, reiterating the importance of maintaining “social stability” (i.e., suppressing and/or containing potential challenges to the party-state and its policies, preferably at the germination stage).¹¹³⁵ Xi urged officials to “do your utmost to defend the normal economic and social order,”¹¹³⁶ and called specifically for a greater presence of security forces: “We must increase the involvement of the police forces, strengthen the conspicuous use of police forces, fully implement the joint prevention and control mechanism of the joint logistics and joint mobilization of the public security forces and the People’s Armed Police, and increase the visibility of the police [to the public] and their ability to manage [situations]. We must maintain a strike-hard, high-pressure posture....”¹¹³⁷

In order to mute public criticism of Beijing’s response to the outbreak, Xi ordered officials to redouble information control measures and propaganda to shape public opinion in ways that conform to the CCP’s narrative: “Currently the epidemic prevention and control situation is grave and complex, and some of the masses are anxious and have a fearful mind. We must redouble our efforts at propaganda and public opinion work, plan as a whole for both online and offline [information controls], domestic and international, on minor matters and major issues, and do better at strengthening confidence, warming people’s hearts, unifying the people’s minds, so as to better safeguard the overall stability of society.”¹¹³⁸

Xi Jinping told officials to “do your utmost to stabilize the public mood,”¹¹³⁹ and stressed: “[W]e must control overall public opinion and diligently strive to create a good public opinion atmosphere. Strengthen the management and control of online media...and crack down in accordance with the law on those who take the opportunity to spread rumors and create trouble.”¹¹⁴⁰ Xi further tasked the propaganda apparatus with manipulating international perceptions to the CCP’s advantage: “Take the initiative to effectively influence international public opinion.... [T]ell the story of China’s fight against the epidemic well....”¹¹⁴¹

Xi closed his remarks by pointing to how the epidemic had exposed “shortcomings” in the system. “This epidemic has been a major test of our country’s governance system and capabilities, and we certainly must review our experiences and absorb the lessons,” Xi said, “It is necessary to improve the national emergency management system and

improve our ability to deal with urgent, difficult, dangerous, and weighty tasks in response to the shortcomings and deficiencies exposed during the response to this epidemic.”¹¹⁴² He reiterated this point for good measure: “This epidemic has exposed the continued existence of shortcomings and blind spots in our governance of urban public environments. We must conduct a thorough investigation and rectification to make up for the shortcomings in public health.”¹¹⁴³

While Xi did not clearly articulate all of the shortcomings that he had in mind, he gave one important example, and in so doing, he may have unintentionally pointed to a much earlier timeline for the outbreak (and by implication, knowledge of that outbreak): “This epidemic exposed a severe lack of reserves of key epidemic prevention supplies (such as personal protective suits).”¹¹⁴⁴ Xi ordered officials to boost reserves of PPE and to consider what other types of strategic supplies may need replenishing.

Without saying so explicitly, Xi went on to imply that the wildlife trade may have caused the epidemic:

We have long recognized that eating wild animals is very risky, but the “wild game industry” is still immense in size, posing a major hidden danger to public health and safety. We cannot be indifferent to this anymore! I have already issued written instructions on this issue. Relevant departments should strengthen the implementation of laws, strengthen regulation of markets, resolutely ban and severely crack down on illegal wildlife markets and trade, resolutely eradicate the bad habit of eating wild animals, and control major public health risks from the source.¹¹⁴⁵

Curiously, Xi’s next comment was much more relevant to a biocontainment failure than to a zoonotic spillover at a wet market: “We must also promptly introduce the Biosecurity Law and other laws.”¹¹⁴⁶ As documented earlier in this chronology, the NPC began drafting the Biosecurity Law at Xi’s behest in July 2019 and completed its first reading in October 2019. The law was passed in October 2020. The text of the law contains only one perfunctory and passing reference to the prevention of the spread of zoonotic diseases,¹¹⁴⁷ but it dedicates an entire chapter with multiple provisions to strengthening biosafety and biosecurity in laboratories. Xi would revisit the issue of biosafety and biosecurity in greater detail in a speech on February 14.

FEBRUARY 2020: FAMOUS LIBERAL ACADEMIC BLAMES XI JINPING FOR CORONAVIRUS COVER-UP

On February 4, Xu Zhangrun, a famous jurist and law professor at Tsinghua University in Beijing, published a polemical essay online called “When Fury Overcomes Fear,” which levied a scathing criticism at Xi Jinping for his mishandling of the COVID-19 outbreak (without ever directly invoking his name). Xu wrote eloquently of the human toll of the political cover-up of the outbreak, noting that the authorities were determined to ensure that the world never knew the full scope of the toll: “As I write these words, in the city of Wuhan, and within the province of Hubei, there are still countless numbers of people unable to get adequate medical attention, people who have been abandoned as they wail in hopeless isolation. Will we ever know how many people have as a result been condemned to a premature death? This is the reality of the so-called ‘all-powerful state....’”¹¹⁴⁸ Xu called for an independent inquiry into the origin of pandemic and its cover-up: “It should also be a matter of pressing urgency that an independent body be established to investigate the origins of the coronavirus epidemic, to trace the resulting cover-up, identify the responsible parties, and analyze the systemic origins of the crisis.”¹¹⁴⁹

Xu noted how the censorship apparatus of the party-state, the largest the world has ever known, worked overtime to stifle public discussion of the outbreak: “Censorship increases by the day, and the effect of this is to weaken or obliterate those very things that can and should play a positive role in alerting society to critical issues [of public concern]. In response to the coronavirus, for instance, at first the authorities shut down all hints of public disquiet and outspoken commentary via censorship; they then simply shut down entire cities.”¹¹⁵⁰ Xu placed the blame for the resultant suffering squarely at the feet of Xi Jinping:

The cause of all of this lies, ultimately, with The Axle [that is, Xi Jinping] and the cabal that surrounds him. It began with the imposition of stern bans on the reporting of accurate information about the virus, which served to embolden deception at every level of government, although it only struck its true stride when bureaucrats throughout the system consciously shrugged off responsibility for the unfolding crisis while continuing to seek the approbation of their superiors. They stood by blithely as the crucial window of opportunity that was available to deal with the outbreak snapped shut in their faces.... The storied bureaucratic

apparatus that is responsible for the unfettered outbreak of the coronavirus in Wuhan repeatedly hid or misrepresented the facts about the dire nature of the crisis. The dilatory actions of bureaucrats at every level exacerbated the urgency of the situation. Their behavior has reflected their complete lack of interest in the welfare and the lives of normal people. What is of consequence for them is their tireless support for the self-indulgent celebratory behavior of the “Core Leader,” whose favor is constantly sought through their adulation for the peerless achievements of the system. Within such a self-regarding bureaucracy, there is even less interest in the role that this country and its people can and should play in a globally interconnected community.¹¹⁵¹

FEBRUARY 2020: REVISED CASE DEFINITION **COMPLICATES** CONFIRMATION OF CASES OUTSIDE HUBEI

On February 4, the NHC issued its fifth edition of surveillance guidelines for the novel coronavirus.¹¹⁵² This set of guidelines instructed health officials to treat the diagnosis of novel coronavirus cases differently for individuals located anywhere in the country outside of Hubei Province, for which Wuhan is the capital, and those who are located in Hubei. While suspected cases in Hubei Province could be diagnosed with only two of the three clinical manifestations,¹¹⁵³ even in the absence of any of the four identified epidemiological links,¹¹⁵⁴ a suspected case in all other provinces had to fulfil all three clinical criteria if an epidemiological link was not established.¹¹⁵⁵ In both cases, whether inside or outside of Hubei Province, a “suspected case” could only become a “confirmed case” if at least two clinical symptoms accompanied a positive test. Patients who tested positive but were asymptomatic, pre-symptomatic, or mildly symptomatic were excluded from the public count of “confirmed cases.” PRC authorities reportedly classified the number of known cases that were asymptomatic, pre-symptomatic, or mildly symptomatic in China as a state secret.¹¹⁵⁶

FEBRUARY 2020: JOURNALIST CHEN QIUSHI **DISAPPEARS** WHILE DOCUMENTING SUFFERING IN WUHAN

On February 6, a 34-year-old lawyer turned citizen journalist Chen Qiushi, who had traveled to Wuhan to investigate the outbreak, posted his last video report online detailing the dire conditions that he was observing in Wuhan. His family was soon notified that he had been detained by security agents, who described his detention as “quarantine.”¹¹⁵⁷ Chen had traveled from Qingdao to Wuhan on the last train in service

on January 24 as the city went on lockdown, and he issued several reports to his 740,000 followers on social media about the medical emergency unfolding in the city until security agents detained him.¹¹⁵⁸ He visited the Huanan Seafood Market and a series of hospitals, recording the influx of patients and speaking with nurses about the virus. Chen's reporting struck a nerve with the Chinese public by revealing important facts, such as his interviews with local taxi drivers who attested to chatter about the appearance of a "SARS-like illness" in early December.¹¹⁵⁹

For seven months after he disappeared into custody, no information about Chen's wellbeing or whereabouts was provided by the authorities. In September 2020, a friend of Chen's revealed that Chen had been allowed to return to his hometown of Qingdao but remained in a form of strict detention called residential surveillance.¹¹⁶⁰ No further public information was revealed about Chen until September 30, 2021, when Chen posted a video and letter online. "Over the past year and eight months, I have experienced a lot of things. Some of it can be talked about, some of it can't," Chen wrote in the letter, "I believe you understand."¹¹⁶¹

FEBRUARY 2020: COVID-19 KILLS WHISTLEBLOWER DOCTOR, CENSORS OVERWHELMED BY OUTCRY

On February 7, Dr. Li Wenliang of the Central Hospital of Wuhan, a whistleblower who leaked information about the outbreak of a SARS-like virus in late December and was subsequently punished for "spreading rumors," died from COVID-19.¹¹⁶² Li's death set off an unprecedented torrent of stinging criticism of the authorities on social media in a volume so great that it overwhelmed the party-state's formidable censorship apparatus for several hours. This outpouring of grief included a short-lived campaign under the hashtag #WeWantFreedomOfSpeech, directed against what many Chinese viewed as an attempt by officials to cover up the public health crisis.¹¹⁶³ Even two years after Li's death, Chinese netizens were still flocking to his social media page to leave commemorative messages honoring his legacy.¹¹⁶⁴

FEBRUARY 2020: BUSINESSMAN DISAPPEARS AFTER REVEALING IMAGES OF MOUNTING DEATH TOLL

On February 9, a businessman turned citizen journalist Fang Bin disappeared after posting video reports of what was happening in Wuhan online.¹¹⁶⁵ On January 25, Fang began sharing video footage online that he had filmed around the city depicting the harsh

conditions of lockdown. On February 1, Fang posted a video of bodies of those who had died of the novel coronavirus piling up at Wuhan hospitals and being loaded onto buses. On February 2, he disclosed that the authorities had seized his laptop and interrogated him, and he disappeared on February 9.¹¹⁶⁶ More than three years later at the time of writing, the authorities have still not disclosed any information about his whereabouts, wellbeing, or any legal charges he may be facing. Fang is reportedly a practitioner of Falun Gong, a religious movement that has been banned in China since 1999, who has been previously incarcerated for practicing his faith.¹¹⁶⁷

FEBRUARY 2020: BEIJING FURTHER **STRENGTHENS CONTROL** OF BSL-3 & BSL-4 LABORATORIES

On February 9, seven cabinet-level ministries and subordinate departments of the PRC central government,¹¹⁶⁸ one of which was the CAS, jointly issued a nationwide directive titled "Notice on Strengthening Biosafety Management of Laboratories [Studying] Zoonotic Pathogenic Microorganisms."¹¹⁶⁹ The directive stated its purpose clearly as "to deeply implement the holistic view of national security, earnestly advance the biosecurity of the state, and further strengthen the biosafety management of laboratories [studying] animal pathogenic microorganisms."¹¹⁷⁰ It further emphasized the link between the political stability of the regime and biosafety: "The biosafety of laboratories [studying] pathogenic microorganisms is an important component of the biosecurity of the state."¹¹⁷¹

Readers will hear echoes of several reports at the WIV in 2019 in the directive's reference to "hidden dangers" as a justification for the actions it was ordering provincial and local authorities to take: "Problems and hidden dangers still exist in the biosafety management work at some laboratories. Each local government and relevant department must earnestly strengthen their sense of responsibility and sense of mission to do a good job with biosafety management of laboratories [studying] pathogenic microorganisms, strengthen their security mindset, improve management measures, carry out management responsibilities, and effectively prevent and neutralize biosafety dangers in laboratories."¹¹⁷²

If the central authorities believed that the initial human infection of SARS-CoV-2 likely occurred at the Huanan Seafood Market in Wuhan, it is unclear why they took the time to address biosafety conditions at BSL-3 and BSL-4 laboratories nationwide precisely

when the COVID-19 outbreak was at its most acute stage in China and they were urgently mobilizing an all-hands-on-deck response. After all, the NHC had just issued the second edition of the Laboratory Biosafety Guidelines for the Novel Coronavirus on January 23, and the NHC was one of the seven agencies that issued this new notice on February 7. Clearly the central leadership believed that a broader directive was needed focusing on BSL-3 and BSL-4 labs regardless of whether they were working with SARS-CoV-2. The directive's focus on BSL-4 labs is particularly significant because only two such labs were in operation in China at the time – the one at the WIV and another in Harbin.¹¹⁷³

The decision to issue another regulatory directive suggests a recognition that biosafety problems were serious enough that they had to be addressed immediately and could not wait until after the outbreak was under control. Judging from how the problem was framed in this and other directives, the CCP leadership likely believed that addressing laboratory biosafety was necessary to bring the outbreak under control. In their domestic response to the pandemic, PRC authorities recognized that poor biosafety conditions could lead to accidental infections, and they took actions accordingly. In communications with the outside world, however, Beijing adamantly dismissed (and continues to dismiss) the possibility that the virus could have emerged from a laboratory incident.

The directive had five particularly notable provisions. First, it sought to standardize an administrative permit process that would require any person or institution conducting research and experiments in BSL-3 and BSL-4 labs that would involve highly pathogenic agents, or agents suspected to be highly pathogenic, to obtain advanced approval from provincial authorities in order to commence the work. Second, it required provincial authorities to strengthen their inspection regime for labs within their jurisdictions. Third, it required BSL-3 and BSL-4 labs to seek guidance on maintaining lab security from local offices of the Ministry of Public Security.

Fourth, provincial authorities were told to "strictly investigate and deal with" unauthorized research, to "strengthen management of the publication of research findings" for labs in their jurisdiction, and to incorporate lab safety management as a criterion for the performance evaluations of labs. Fifth, the directive included an entire subsection on the importance of managing the storage and preservation of viral and

bacterial samples. The reader may recall that the risks of improper storage of viral strains and samples was a theme in reporting at the WIV in 2019. In July 2019, the WIV issued a procurement notice for a project involving a scalable and automated sample storage management system, and in November 2019, the proper storage of viral samples was a major focus of a biosafety training led by officials from Beijing.

The directive called on local officials who inspect laboratories to remember that biosafety risks exist not just inside the laboratory, but from the beginning of the collection process of pathogen discovery: “Staff who collect samples of highly pathogenic microorganisms shall prevent the spread of pathogenic microorganisms and infections during the collection process and keep detailed records of the source of the sample, the collection process, and the method in which the samples were taken.”¹¹⁷⁴ It also recognized the importance of proper waste management and the risk of infection if a live virus used in an experiment is not fully inactivated before disposal: “All laboratories and their subordinate work units should strengthen the supervision of the disposal of waste from relevant experimental activities to ensure effective sterilization and a traceable flow.”¹¹⁷⁵ In July 2019, the WIV issued a procurement notice related to renovation of the hazardous waste treatment system at the BSL-4 lab on the Zhengdian Park campus.¹¹⁷⁶

Another provision of the directive pointed to the need to address laboratory construction issues, telling local officials: “[C]ooperate [with other departments] to do a good job in the inspection of new construction, renovations, and expansions of Biosafety Level-3 and Level-4 laboratories. Establish and improve the inter-departmental information exchange mechanism for BSL-3 and BSL-4 laboratory management information, and jointly promote the construction of laboratories in accordance with laws and regulations.”¹¹⁷⁷ Readers will recall reports from June and November 2019 that made references to construction problems at the new Zhengdian Park campus of the WIV and a lack of relevant expertise that they called the “three nos.”¹¹⁷⁸

FEBRUARY 2020: SENIOR WUHAN AND HUBEI PARTY OFFICIALS SACKED

On February 11, CCP central authorities removed the two most senior public health officials in Hubei Province – Zhang Jin, the CCP party secretary of Hubei Provincial Health Commission and Liu Yingzi, the commission’s director – and replaced them with the deputy director of the NHC, Wang Hesheng. Earlier in February, 337 officials in Hubei Province were penalized in unspecified ways, including six officials who were

terminated for “dereliction of duty.”¹¹⁷⁹ On February 13, CCP central authorities removed Hubei Provincial Party Secretary Jiang Chaoliang, a loyalist of PRC Vice President Wang Qishan, and replaced him with then Shanghai Major Ying Yong, who worked closely with Xi Jinping earlier in his career when Xi was party secretary of Zhejiang province.¹¹⁸⁰ CCP central authorities also removed Wuhan Municipal Party Secretary Ma Guoqiang and replaced him with Jinan Municipal Party Secretary Wang Zhonglin, but the facts around his removal suggested it was a political reshuffle, not a punishment of Ma.¹¹⁸¹

No reason was given for Jiang’s and Ma’s removal, but Ma may have sealed his fate when he admitted in a nationally televised interview that the impact of the virus on China and the world “would have been less” if containment measures had been taken sooner.¹¹⁸² Wuhan Mayor Zhou Xianwang likewise crossed Beijing by admitting to the public that the reason it took local authorities so long to warn their residents about the novel coronavirus was that they could not speak out until they had clearance to do so from above.¹¹⁸³ Beijing knew it risked provoking public ire if it removed Zhou immediately for his frank comments, which were an accurate account of both how things transpired and how the political system is designed to work, so Beijing waited until January 2021 to quietly push Zhou out of office.¹¹⁸⁴

This relatively limited personnel shuffle nevertheless stood in stark contrast to the “vast purge” that the CCP carried out in the spring of 2003 after it admitted that officials had been covering up the outbreak of SARS-CoV-1.¹¹⁸⁵ No subsequent purge of relevant officials has been observed related to the cover up of key information about SARS-CoV-2, which suggests that local officials who engaged in obfuscation were following Beijing’s directions, the first known instance of which was the NHC’s issuance of a nationwide gag order on January 3, as described above.

FEBRUARY 2020: TOO-GOOD-TO-BE-TRUE NUMBERS CONCEAL THE SCOPE & SEVERITY OF OUTBREAK

By February, it was becoming increasingly clear that the official PRC accounting of COVID-19 cases and related deaths in China was not believable, because, as one economist who focuses on China aptly put it, the data were “not arithmetically sensible.”¹¹⁸⁶ From the moment that Wuhan authorities partially acknowledged a pneumonia outbreak on the last day of 2019 until the time of this study’s publication in

spring 2023, the official tally of COVID-19 cases and fatalities in China has diverged wildly from the pattern of experience with this disease as reflected in the data released by every other country in the world that lacks a regime with a similar penchant for making data conform to its political prerogatives.

In March 2020, U.S. intelligence agencies reportedly concluded that PRC authorities had fabricated COVID-19 figures to intentionally undercount and conceal the true scope and severity of the outbreak.¹¹⁸⁷ That same month, British scientists advising Downing Street also reportedly told Prime Minister Boris Johnson that the PRC reports of COVID-19 infections were “downplayed by a factor of 15 to 40 times.”¹¹⁸⁸

A brief review of a few of the oddities plaguing the PRC’s official COVID-19 figures is sufficient to conclude that the data are neither complete nor accurate. As previously noted, not a single new case was reported by PRC authorities between January 5 and 17, 2020, even though retrospective infection data shows that at least hundreds were infected during this time.¹¹⁸⁹ The NHC revised the case definition for COVID-19 six times over the course of a month and a half,¹¹⁹⁰ with unusually complex and narrowly defined criteria that were seemingly designed to exclude all but the most severe cases that had clear epidemiological links to Wuhan.

Patients with a positive test result, but no symptoms or only mild symptoms, were not counted. The number of known cases that were asymptomatic, pre-symptomatic, or mildly symptomatic was reportedly classified as a state secret.¹¹⁹¹ Hubei Province did not start counting untested but clinically diagnosable patients with severe COVID-19 symptoms, including those who died from the disease before being tested, until late February. It is unclear if the rest of China was ever allowed to count clinically diagnosed patients, as the central authorities continued to exclude such cases after Hubei started counting them.¹¹⁹² To this day, scientific studies of COVID-19 mortality have no choice but to exclude China from consideration because it is the only country in the world, save Greenland and the former Spanish Sahara, which does not publish data on excess mortality.¹¹⁹³

One quantitative finance specialist who reviewed the PRC data in mid-February 2020 found that the number of cumulative deaths reported by the authorities could be described and predicted by a simple mathematical formula to a very high degree of accuracy, meaning there was essentially zero unexpected variability in the reported cases

from day-to-day.¹¹⁹⁴ A biostatistician at New York University's School of Global Public Health who reviewed the PRC data likewise found its neat and tidy predictability to be unsettling and inconsistent with established knowledge about how epidemics evolve. "I have never in my years seen an r-squared of 0.99. As a statistician, it makes me question the data.... Real human data are never perfectly predictive when it comes to something like an epidemic," the biostatistician explained, "A really good r-squared, in terms of public health data, would be a 0.7. Anything like 0.99 would make me think that someone is simulating data. It would mean you already know what is going to happen."¹¹⁹⁵

Throughout winter and spring of 2020, PRC authorities claimed that the worst of the outbreak was limited to Hubei Province and its capital of Wuhan, which supposedly accounted for 97 percent of all COVID-related deaths,¹¹⁹⁶ with only isolated pockets of cases elsewhere. All of the reported deaths in Hubei ostensibly occurred between January 1 and March 31, 2020. Thereafter, all reporting ceased.¹¹⁹⁷ Derek Scissors, an economist whose specialty is China, believes that the reported cases outside of Hubei were "low by factor of 100 or more."¹¹⁹⁸ Starting with a conservative estimate of 1.2 million migrants having left Hubei before the lockdown began (official state media in late January claimed between 1.5 to 2 million had left), combined with a conservative estimate of the infection rate (2.3 percent, the lowest number available), and assuming the virus had circulated for 21 days at that point (which is certainly an underestimate), Scissors was able to make an inference based on Italy's experience, the only model available at that time, which had reached 130,000 cases within 21 days of known circulation. Scaling up for the massive difference in population between the two countries, China had 2.9 million cases outside of Hubei Province in January 2020 alone.¹¹⁹⁹

Other attempts to generate more accurate estimates of the impact of COVID-19 in China show how grossly understated the official numbers have been. Based on excess mortality calculations, the Economist has surmised that the true number of deaths in China is approximately 1.7 million and the official statistics have understated the death rate by 17,000 percent.¹²⁰⁰ Total excess deaths in Wuhan alone between January 1, 2020, and March 31, 2020, reached at least 13,400, according to the Economist, an estimate that is more than triple the official tally.¹²⁰¹

A study conducted by the University of Washington, Ohio State University, and AT&T examined crematoriums in Wuhan in an attempt to approximate the actual death toll. They found that the city may have been incinerating between 800 and 2,000 bodies per day by the second week of February, which was at a time that the official COVID-19 death toll for all of China remained at around 700. Wuhan's crematoriums, as many as 86 of them, were found to be operating at full capacity and for 24 hours a day while local funeral homes were purchasing thousands of urns. The team estimated that around 36,000 people had died in Wuhan alone by mid-March; the central authorities acknowledged 2,524 deaths nationwide at the time.¹²⁰²

Others have highlighted the incongruity between China's low case numbers and its claimed fatality rate. China's officials claim that the total case fatality rate in Wuhan, that is, the percentage of infected individuals who died, during this period was 5.6 percent, which is four times higher than the U.S. fatality rate of about 1.5 percent for COVID-19 infections.¹²⁰³ As one expert explained: "Either Covid was far more deadly in early 2020 in Wuhan than anywhere else, at any other time. Or – the denominator in the CFR calculation, which is the number of infections officially reported, was too small by a factor of 3 or 4."¹²⁰⁴

Beijing would have us believe that China's total cases dropped approximately 91 percent from February 17 to March 22, 2020.¹²⁰⁵ They further claim that all deaths attributable to COVID-19 stopped abruptly in April 2020 (the same month that Xi Jinping declared victory in the "people's war" on COVID-19) despite tens of thousands of officially reported COVID-19 cases throughout China occurring since that time.¹²⁰⁶ Such claims can have no basis in reality, especially when we consider that the vaccination rate among the elderly is relatively low in China¹²⁰⁷ and the PRC-developed vaccines have low efficacy.¹²⁰⁸ For better perspective, the PRC claim to have had no COVID-related deaths since April 2020 would grant China a mortality rate 30 times lower than South Korea's, 50 times lower than Singapore's, and 73 times lower than New Zealand's during the same period.¹²⁰⁹ Moreover, trends in China's crude death rate tell us that the official claims about COVID-19 deaths cannot be true. The rate of increase in China's death rate accelerated by a factor of six times between 2019 and 2021 compared to the previous decade. In absolute numbers, the sharp inflection added almost one million "surplus" deaths above the trend line.¹²¹⁰

Beijing's production of too-good-to-be-true data is nothing new to regular observers of China. The CCP has spent decades earning its notoriety for fudging and/or fabricating economic figures¹²¹¹ and population data.¹²¹² Beijing's record of withholding the facts related to historical tragedies of its own making is even more damning. Just to name a few of the worst cases, historians' estimates of the actual death tolls from the famine that the Great Leap Forward induced,¹²¹³ the violent chaos unleashed during the Cultural Revolution,¹²¹⁴ and the military suppression of unarmed students protesting for political change in Tiananmen Square,¹²¹⁵ all far exceeded what Beijing has been willing to acknowledge, even decades after the fact and the deaths of key decision-makers at those times.

FEBRUARY 2020: PRC AUTHORITIES FINALLY ADMIT MEDICAL STAFF INFECTED

On February 14, the NHC acknowledged that SARS-CoV-2 was spreading to and among medical professionals, and that a total of 1,716 healthcare workers had been infected in China.¹²¹⁶ That disclosure meant that the number of healthcare workers in China infected with the SARS-CoV-2 had already exceeded the global total of healthcare workers infected during the entirety of the SARS epidemic from 2002-2003.¹²¹⁷ The actual number of infections would likely be much higher if the authorities had counted asymptomatic, pre-symptomatic, and mildly symptomatic cases. Readers will recall that the authorities explicitly denied any infections among medical professionals in the official announcement of the outbreak issued on December 31,¹²¹⁸ a refrain that continued to appear in official statements, despite healthcare workers reporting illness after treating patients as early as December,¹²¹⁹ until January 20 when the authorities acknowledged limited human-to-human transmission and 15 cases of healthcare workers in Wuhan who had contracted COVID-19.¹²²⁰

FEBRUARY 2020: XI REITERATES BIOSECURITY CONCERNS IN CONTEXT OF PANDEMIC RESPONSE

On the afternoon of February 14, Xi Jinping convened a meeting of the Commission on Comprehensively Deepening Reform under the Politburo of the CCP Central Committee to address the challenge of reforming China's epidemic prevention and control system.¹²²¹ Xi repeated his call from February 3 to strengthen biosecurity and biosafety (detailed above and below), including by incorporating both concepts into the PRC's national security framework and accelerating the passage of the Biosecurity Law. As we

will discuss below, Xi's comments also set off a flurry of regulatory activity by the State Council and its subordinate agencies, such as the MOST and the CDCP. Xi reiterated some of the themes he had touched on in late January and early February:

We must not only maintain a foothold in the present situation to win the blockade war of epidemic prevention and control scientifically and accurately, but we must also take the long-term perspective, review our experiences, and absorb the lessons. In light of the shortcoming and deficiencies exposed by this epidemic, we must pay special attention to making up for the shortcomings, patching the holes that leak, and fortifying the weak spots. What should be upheld must be upheld, what should be improved must be improved, what should be built must be built, and what should be implemented must be implemented in order to improve the system and mechanisms for major epidemic prevention and control and strengthen the national system for public health emergency management.¹²²²

Xi apparently spoke at greater length on this occasion about the importance of shoring up biosafety and biosecurity in the context of preventing and control epidemics than he did in his February 3 speech to the Politburo Standing Committee. Xinhua reported that "Xi Jinping emphasized that it is necessary to strengthen legal protections for public health by comprehensively strengthening and improving the development of relevant laws and regulations in the field of public health, and by carefully evaluating the revision and improvement of laws and regulations such as the Law on the Prevention and Control of Infectious Diseases and the Law on Wildlife Protection."¹²²³ More importantly, Xi drew a clear link between the political security of the party-state, public health, and better regulation of biosafety and biosecurity:

From the high-priority perspective of protecting the people's health, safeguarding the security of the state, and defending the lasting political stability of the state, we must incorporate biosecurity and biosafety into the national security system, systematically plan for the construction of a national biosecurity and biosafety risk prevention and control system, and comprehensively improve the state's biosecurity and biosafety governance capabilities. It is necessary to press forward with the introduction of the biosecurity law as soon as possible and accelerate the construction of a national legal and regulatory system for biosafety and biosecurity as well as a system of institutional safeguards.¹²²⁴

Xi's explicit linking of the stability of the CCP political system with the biosecurity/biosafety of laboratories was a noteworthy development. In the highly scripted and regimented informational environment maintained by the CCP, improvisation is an alien concept. There is virtually no chance that the underlying implication of Xi's statements – namely, that the COVID-19 outbreak could have resulted from a biosecurity/biosafety issue – would have been lost on Xi himself and the propaganda officials who edit reports of his speeches and manage the packaging and release of them.¹²²⁵ Moreover, at the time that Xi made these comments, the CCP was already suppressing online speculation by Chinese citizens who suspected that the novel coronavirus was bioengineered and had escaped from a laboratory.¹²²⁶ Some analysts surmised that Xi's willingness to disclose, however subtly, such potentially damaging information that hinted at a biosecurity incident was likely indicative of disputes inside the CCP over the adequacy of the leadership's response to the devastating outbreak and who deserved the blame for the emergence and spread of the virus.¹²²⁷

Another theme raised in Xi's February 3 speech – the lack of key reserves prior to the pandemic – received fuller attention in his February 14 speech. "Optimize and ensure the production capacity and regional distribution of important emergency materials, so that they can be called up and used at critical moments," Xi underscored to officials.¹²²⁸ While Xi did not specifically mention PPE as one of the important emergency materials, he did explicitly mention PPE in the February 3 speech as an example of insufficient reserves. Moreover, the context of Xi's concerns about reserves in this speech also suggested that PPE was among the items for which officials had failed to stockpile sufficiently.

"For short-term possible shortages of material supplies, a centralized production management mechanism will be established to uniformly organize the supply of raw materials, arrange fixed-point production, and standardize quality standards, so as to ensure an orderly and forceful guarantee of emergency materials," Xi explained, "It is necessary to improve the national reserve system, scientifically adjust the categories, scale, and structure of the reserves, and upgrade the efficiency of the reserves. It is necessary to establish a unified national emergency material procurement and supply system, implement centralized management, unified allocation, and unified distribution of emergency relief materials, and promote a more efficient, safe, and controllable emergency material supply network."¹²²⁹

One of Xi's comments suggested that he thought the outbreak could have been contained at the local level if officials had acted sooner and more aggressively: "Xi Jinping pointed to the necessity to reform and improve the epidemic disease prevention and control system, to resolutely implement a prevention-centric approach to the work and policies of public health and [individual] health, to insist on always being alert, moving the prevention threshold forward [in time], and preventing minor diseases from turning into major epidemics."¹²³⁰ He called on officials to "strengthen risk awareness, improve the coordinated system for the determination, assessment, decision-making, prevention and control of major risks to public health,"¹²³¹ and to rely on technology to do so: "It is necessary to encourage the use of digital technologies, such as big data, artificial intelligence, and cloud computing, to better bring into effect its supporting role in areas such as epidemic monitoring and analysis, tracing the source of the virus, prevention, control, and treatment, and resource allocation."¹²³²

FEBRUARY 2020: BEIJING ISSUES YET ANOTHER SET OF BIOSAFETY GUIDELINES FOR SARS-COV-2

On February 15, the PRC MOST issued new rules to strengthen the management of biosafety and biosecurity in laboratories that study "high-level viruses," particularly singling out SARS-CoV-2.¹²³³ The directive was called "Guiding Opinion Concerning the Strengthening of Biosafety at Novel Coronavirus High-Level Virus Microbiological Laboratories,"¹²³⁴ and it was apparently issued quickly in response to Xi's remarks on February 3 and 14.¹²³⁵ The MOST was also one of the seven cabinet-level agencies mentioned above that issued a directive to BSL-3 and BSL-4 laboratories just six days earlier on February 9. It appears that one difference between the February 9 directive and the February 15 directive is that the latter specifically addressed SARS-CoV-2, while the former was more generally focused on the risk of "zoonotic pathogenic microorganisms." While the MOST issued this regulatory measure because it had the benefit of immediacy, the ministry still saw a clear need for the NPC to finalize and pass the Biosecurity Law.¹²³⁶ The directive's purpose was described as "promoting the establishment of a long-lasting mechanism to prevent and control biosafety risks."¹²³⁷

The full text of the February 15 directive could not be located, including on any PRC government website. Given the subject matter and its focus on SARS-CoV-2, it was likely marked internal or classified, and thus never released to the public. An official CCP report from Heilongjiang Province, however, gave some insight into its content:

In accordance with the Guiding Opinion Concerning the Strengthening of Biosafety at Novel Coronavirus High-Level Virus Microbiological Laboratories, we must comprehensively strengthen biosafety education and eliminate hidden biosafety dangers, organize the vast majority of employees to earnestly study the systems related to “biosafety management,” go a step further to remind research personnel to do a good job in their own personal protection while conducting scientific research, ensure that scientific research is carried out in an orderly manner, and implement biosafety precautions.¹²³⁸

On the day the directive was issued, Wu Yuanbin, a senior official at the MOST, also spoke briefly about the directive at the NHC’s press conference on the epidemic response.¹²³⁹ Wu made the following comments:

The Guiding Opinion Concerning the Strengthening of Biosafety at Novel Coronavirus High-Level Virus Microbiological Laboratories was issued to require laboratories to become a platform serving the needs of the science and technology campaign to tackle the problem [of the outbreak]. All supervisory departments must strengthen the management of laboratories, especially the viruses [held in those laboratories], to ensure biosafety [is maintained]. When carrying out the science and technology campaign to tackle the problem [of the outbreak], the emphasis should be not only placed on special matters requiring special handling, but also emphasize compliance with laws and regulations....¹²⁴⁰

FEBRUARY 2020: ANIMALS TRIALS OF VACCINE ALREADY UNDERWAY

On February 15, Yan Jinghua, a senior researcher at the CAS Institute of Microbiology, spoke briefly at a press conference held by the NHC on the epidemic response.¹²⁴¹ Yan was involved in one of the research groups that was developing a recombinant protein vaccine for SARS-CoV-2, and prior to that, she had done considerable work on vaccine development for the MERS coronavirus. In the course of explaining the progress achieved toward developing a vaccine for the novel coronavirus, Yan noted that animal trials were already underway: “Currently we have already finished the design of this vaccine [recombinant protein type], now we are already conducting tests in animals to see its immunogenic effect, and then we must conduct a safety evaluation. At present the work we are also in the process of doing is researching and developing the production technology [for the vaccine].”¹²⁴²

Readers will recall that PRC authorities did not admit that the novel coronavirus was contagious until January 20, and now, less than a month later, we are told that a candidate vaccine is already being tested in animals. This abbreviated timeline raises questions about when the work on the vaccine actually began. It could not have begun on or after January 20 because that would not have afforded enough time to reach this stage of vaccine development before February 15. We can thus infer that state-run research institutes like the CAS were likely tasked with developing a vaccine before the authorities even admitted to the public that one person could transmit the virus to another.

FEBRUARY 2020: CHINESE SCIENTISTS AND NETIZENS CONTINUE TO SPECULATE ABOUT LAB ORIGIN

On February 15, Xiao Botao of the South China University of Technology, who had recently returned from postdoctoral training at Harvard Medical School, and Xiao Lei of the Wuhan University of Science and Technology published a pre-print paper arguing that the “coronavirus probably originated from a laboratory in Wuhan,” specifically pointing to a laboratory of the Wuhan CDCP, located within walking distance of the Huanan Seafood Market, and the WIV, both of which specialized in pathogen collection and identification and studied the bats most likely to be the natural reservoir of such a coronavirus.¹²⁴³ They assessed that a zoonotic spillover was unlikely to have occurred in an urban setting like Wuhan, particularly as it would have involved bats that are not endemic to the area. They further noted the lack of evidence pointing to an animal that may have served as an intermediate host.¹²⁴⁴

On February 17, WIV researcher Chen Quanjiao, or someone claiming to be Chen, posted on social media that WIV Director Wang Yanyi was responsible for the lab leak, and suggested that the virus transmitted from the lab to the Huanan Seafood Market as a result of Wang selling animals used in experiments to the market for consumption by unknowing customers. By evening, the WIV had put out a written statement in Chen's name claiming that someone had “fabricated this rumor using my name.”¹²⁴⁵ While the claim of lab animals being sold to the market may seem farfetched, such cases have occurred in China.¹²⁴⁶

FEBRUARY 2020: THE **CURIOUS** CASE OF HUANG YANLING

Reports that started spreading widely on Chinese social media in January concerning a graduate student at the WIV named Huang Yanling reached a fever pitch by February 15, following reporting on the case by the Beijing News that has since been removed from its website. Huang was believed to be COVID-19's patient zero, who had allegedly died from the illness after an accidental exposure to the novel coronavirus at the WIV.¹²⁴⁷ On February 16, the WIV released a statement on its website denying that Huang was patient zero and claiming that Huang had left the WIV in 2015 upon graduation, had not returned to Wuhan since that time, and was healthy and working in an undisclosed province at the time that the statement was released. The WIV further scrubbed information about Huang from its website, including her profile biography and photo as well as references to her thesis.¹²⁴⁸ The official Xinhua News Agency published the WIV's statement of denial, without added commentary or reporting, and disseminated it on its own social media accounts, presumably to amplify the WIV's efforts to dispel the rumors.¹²⁴⁹

The WIV's claim that Huang left the institute in 2015 was soon called into question after a photo from the WIV website surfaced on Twitter showing a group of WIV researchers, including Huang and her advisor Wei Hongping, bearing a 2018 timestamp. The photo was promptly removed from the WIV website.¹²⁵⁰ Another state-run media outlet, Red Star News, ran a report claiming that the outlet contacted an unnamed "biological company in Sichuan" where Huang supposedly worked, but the person in charge of her department claimed that Huang declined to be interviewed.¹²⁵¹ The Red Star News report also appears to have been removed from the paper's website. Some analysts have noted that the CCP's failure to produce Huang herself to quell the rumors was surprising, as the party-state has shown no hesitation to force political prisoners, disgraced officials, and even celebrities to appear in public, often on video, to make statements in support of an official narrative.¹²⁵²

FEBRUARY 2020: XI JINPING HOLDS **LARGEST** TELECONFERENCE IN CHINA'S HISTORY

On February 23, a high-level meeting was held in Beijing on coordinating the epidemic response and broadcast as a national teleconference to over 170,000 cadres and military personnel around the country.¹²⁵³ It was the largest teleconference ever held in China's

history, and all the members of the CCP Politburo Standing Committee were in attendance.¹²⁵⁴ Xi Jinping delivered remarks that revisited themes that he had articulated on February 3 and 14, and in some cases, further elaborated on those themes.

Much as he had done on February 3, Xi began his remarks on this occasion with a full-throated defense of his response to the epidemic. For example, after recounting various meetings he had chaired and orders he had handed down starting on January 7, Xi praised his decision on January 22 to order a strict lockdown of Wuhan: “Making this decision required tremendous political courage, but when the time to act comes, one must act, otherwise one will fail to make a decision when one should and suffer the chaos that ensues.”¹²⁵⁵

The CCP responded so well to the outbreak, thanks to Xi’s leadership, that its performance proved the superiority of its political system: “Practice has proved that the CCP Central Committee’s judgment on the epidemic situation was correct, various work deployments were timely, and the measures taken were effective and powerful. The results achieved by the prevention and control work have once again put on full display the outstanding advantages of the leadership of the Communist Party of China and the socialist system with Chinese characteristics.”¹²⁵⁶

On the other hand, Xi continued to express concern about unspecified shortcomings:

In the response to this epidemic, the obvious shortcomings in our country’s system and mechanisms for major epidemic prevention and control, as well as its public health emergency management system, were exposed. We must review and sum up our experiences to absorb the lessons.... [W]e must pay special attention to making up for our shortcomings, patching holes that leak, and fortifying the weak spots to improve our capabilities and raise the level of our response to sudden and major public health incidents.... [W]e must truly solve the problem at the germination stage before a fire breaks out.¹²⁵⁷

Concerns about medical supplies, such as PPE, continued to feature prominently: “Fourth, we must strengthen the emergency supply of medical goods and materials and daily necessities. Fighting the blockade warfare of epidemic prevention and control is, in reality, a logistical support war. We have taken active measures to support the manufacturers of medical protective clothing, face masks, and other urgently needed

medical materials for epidemic prevention and control to quickly resume operations and reach production [quotas]....”¹²⁵⁸

Xi called for research into the coronavirus to ensure that response measures would succeed: “As a newly emergent infectious disease, our knowledge of the novel coronavirus remains relatively rudimentary. It is necessary to integrate multi-disciplinary strengths to launch a scientific research campaign to storm the strategic pass, strengthen theoretical research on the source of infection and the pathogenic mechanism of transmission.... We must intensify efforts to research and develop medicines and vaccines....”¹²⁵⁹ Xi pointed to the CCP’s adept use of its stability maintenance apparatus as a key to their response to the epidemic: “We have promoted social security and stability, properly handled various problems that could arise in the course of epidemic prevention and control, maintained order in the medical system and order in the market, strictly cracked down on epidemic-related crimes, and strengthened psychological counseling and intervention for the masses.”¹²⁶⁰ Xi seemed particularly satisfied with the performance of the CCP’s propaganda system, both inside and outside of China:

We have redoubled our efforts at propaganda and public opinion work, planned as a whole for both online and offline [information controls], domestic and international, on minor matters and major issues, and created an atmosphere that strengthened confidence, warmed people’s hearts, and unified the people’s minds. We standardized and improved information release mechanisms, widely disseminated the decisions and deployments of the Party Central Committee, fully reported on the effectiveness of joint prevention and control measures of various regions and departments, and vividly narrated the touching stories from the frontline of epidemic prevention and control. We spread knowledge of epidemic prevention and control far and wide, and guided the people to view the epidemic in a correct and rational manner.... We responded promptly to the concerns of society..., did not avoid contradictions, and actively promoted the resolution of problems. We improved and strengthened propaganda to the outside world, used various forms to speak out in a timely manner in the international public opinion forums, told China's story of combatting the epidemic well, and promptly exposed the words and deeds of some people with ulterior motives who sought to slander, smear, and stir up trouble by rumormongering....¹²⁶¹

FEBRUARY 2020: PLA FILES CHINA'S FIRST PATENT APPLICATION FOR COVID-19 VACCINE

On February 24, Zhou Yusen, a virologist at the PLA AMMS Institute of Microbiology and Epidemiology, led a team of 11 researchers that filed a patent application with the PRC National Intellectual Property Administration for a COVID-19 vaccine, becoming the first in China to do so.¹²⁶² The application indicated that the patent rights would belong to two organizations, the PLA AMMS Institute of Microbiology and Epidemiology where Zhou worked and a biopharmaceutical firm in Beijing called JOINN Biologics.¹²⁶³ The vaccine was developed under the auspices of an “emergency project” authorized by the MOST, according to JOINN Biologics.¹²⁶⁴

Zhou’s filing came only 35 days after the PRC authorities admitted to the public that human-to-human transmission was occurring, only 46 days after they had confirmed that the causative agent of the pneumonia outbreak was a novel coronavirus, and only 55 days since their first public acknowledgment that a pneumonia outbreak had been detected. The genomic sequence used in the patent, which remains unexploited insofar as can be determined through the available literature, may represent the earliest available sequence of SARS-CoV-2.

Based on the methodology that Zhou’s team used to develop the vaccine and the three experiments conducted to complete the underlying study, U.S. experts in vaccinology and immunology consulted during this study estimated that a minimum of 12-16 weeks lead time (three to four months) would have been required to conduct the necessary technical and animal experimentation to prepare this patent application for submission by February 24. This estimated timeline places the beginning of Zhou’s research in early November 2019 at the latest, perhaps as early as mid-October.

Readers will recall that on November 27, 2019, Zhou and three other PLA researchers, in partnership with a team that included Shi Zhengli and Chen Jing of the WIV, submitted a paper for publication that examined the issue of antibody-dependent enhancement (ADE) of viral entry into human cells.¹²⁶⁵ ADE is a major topic of concern for the development of vaccines and therapeutics, and as such, this work could have contributed to Zhou’s development of a vaccine for SARS-CoV-2. This seems particularly likely when one considers that Zhou’s vaccine targets the receptor-binding domain of the spike protein of SARS-CoV-2, and his joint study with the WIV likewise

explored how a neutralizing monoclonal antibody, which targets the receptor-binding domain of the spike protein of the MERS coronavirus, mediates viral entry.¹²⁶⁶

When asked about the vaccine development timeline at a press conference on February 15, Yan Jinghua, a senior researcher at the state-run CAS Institute of Microbiology also pointed to the usefulness of prior MERS research to the efforts to develop a vaccine for SARS-CoV-2:

Our unit is a Chinese Academy of Sciences team, and the work we have undertaken is [to develop] a recombinant protein vaccine. Recombinant protein vaccines remove the genes of the most effective antigen component of a pathogen, and recombine them in vitro until they express the protein, and then turn it into a vaccine. This [type of] vaccine does not require a [specialized] site [for experimentation], such as is the case for an inactivated vaccine with viral characteristics, which requires a site with a corresponding biosafety level. At present, progress on this vaccine is going very smoothly. Our team has been working on a MERS vaccine for the past two years, and we have achieved some good results in the vaccine design process. After the arrival of the novel coronavirus, we quickly used these tactics and methods in the design of the novel coronavirus vaccine. Currently we have already finished the design of this vaccine, now we are already conducting tests in animals to see its immunogenic effect, and then we must conduct a safety evaluation. At present the work we are also in the process of doing is researching and developing the production technology [for the vaccine].¹²⁶⁷

Like the CAS vaccine development effort described above by Yan, the vaccine for which Zhou and his team sought a patent was also a recombinant protein vaccine.¹²⁶⁸ It is thus significant that Yan drew a line of continuity between prior work on MERS, which both she and Zhou had conducted as recently as 2019, and the hurried efforts to develop vaccines for SARS-CoV-2.¹²⁶⁹ It is unclear whether Yan's team collaborated with Zhou's team directly or worked on a similar vaccine model independently of them. It is possible that their research efforts were separate and distinct, as Yan and another senior official noted that multiple lines of effort were undertaken involving at least five different vaccine models.¹²⁷⁰ Three of the 11 researchers (Zhou and two others from AMMS) who submitted the patent application on February 24, however, also appeared as coauthors

of the MERS paper submitted for publication in November 2019.¹²⁷¹ This overlap suggests some degree of continuity between the two projects.

Like the WIV, the Institute of Microbiology in Beijing where Yan works belongs to the CAS, and it is thus plausible that Yan's institute could have been working with the WIV on vaccine development. We know that General Chen Wei led an AMMS team to the WIV to work on vaccines no later than January 2020, and Zhou and his two AMMS colleagues worked with the WIV's Shi Zhengli and Chen Jing on the MERS study prior to its submission for publication in November 2019. Yan Jinghua was not a contributor to that paper, but she does have historical connections to the PLA AMMS, as she received her doctorate from the AMMS Institute of Bioengineering in 2004.¹²⁷²

FEBRUARY 2020: CCDCP PROHIBITS SHARING VIRUS DATA, IMPOSES PRE-PUBLICATION APPROVAL

On February 24, the CCDCP issued an "urgent notice" to all of its departments and offices around the country regarding requirements for reporting and publishing research results and sharing data related to the novel coronavirus in keeping with "important speeches and important instructions" from Xi Jinping.¹²⁷³ One day later, the CCDCP released "supplemental regulations" that put into place a new approval process to "strictly standardize" central government supervision of novel coronavirus publications. The supplemental regulations stipulated that research papers must be reviewed and approved by the CCDCP Office of Science and Technology before being submitted for outside publication. Researchers were informed that "if necessary," their projects may need higher level approval from the CCDCP Emergency Leading Group or the Department of Science and Education at the National Health Commission.¹²⁷⁴

The regulations outright discouraged research into the novel coronavirus, telling the CCDCP researchers to "not focus on publishing papers until after the epidemic is under control." They ordered that studies already submitted for publication without pre-approval should be retracted immediately. It further prohibited CCDCP staff from sharing any "data, biological specimens, pathogens, cultures" or other information related to the pandemic with other institutions or individuals.¹²⁷⁵ To stress the seriousness of these rules, the directive made clear that not only would individual violators be "dealt with severely," but their entire research units would also be held

accountable. The CCDCP Office of Science and Technology was also charged with conducting a preliminary review of all new research projects related to the pandemic.¹²⁷⁶

FEBRUARY 2020: SECURITY CHIEF CALLS FOR **CRACKDOWN** ON VIRUS-RELATED “RUMORS”

On February 24, State Councilor and CCP Central Committee Member Zhao Kezhi, who at the time served concurrently as Minister of Public Security, gave a speech at a deployment meeting in which public security forces around China received orders pertaining to their “work on preventing and controlling the novel coronavirus pneumonia epidemic and safeguarding political security and social stability.”¹²⁷⁷ Zhao’s lengthy comments betrayed a heightened concern about possible threats to the CCP’s hold on power and framed control and censorship of information pertaining to the epidemic as a critical component of safeguarding political security: “Zhao Kezhi demanded that from the beginning to the end, [we] must place the highest priority on safeguarding political security, strictly prevent and resolutely attack the internal and external hostile forces’ use of the epidemic to carry out all kinds of disturbing and damaging activities. [We also must p]romptly detect and dispose of various types of online rumors and harmful information to resolutely defend the political security of the state.”¹²⁷⁸

FEBRUARY 2020: NPC **EXPANDS BAN** ON WILDLIFE TRADE

On February 24, the NPC Standing Committee decided to impose a “full ban” on illegal wildlife trade, which would entail “completely prohibiting” the hunting, trading, and transportation of terrestrial animals that naturally grow and breed in the wild for the purpose of consumption. It also prohibited the consumption of terrestrial wild animals “of important ecological, scientific, and social value” that are under state protection as well as other terrestrial wild animals, including those that are bred or reared in captivity.¹²⁷⁹ While the decision did not explicitly identify the illegal wildlife trade as playing a role in the outbreak of SARS-CoV-2, it did mention the prevention of “major public health risks” as one reason for the more expansive ban.¹²⁸⁰

The PRC Wildlife Protection Law, which was first enacted in 1988 and revised in 2016, already prohibited the hunting, killing, selling, and purchasing of 1,800 rare and endangered animals unless special permission is granted by the authorities.¹²⁸¹ After the SARS epidemic in 2003, officials banned and culled civets in large numbers once it was discovered that they were the likely intermediary species that transferred the virus to the

human population. The selling of snakes was also briefly banned in Guangzhou municipality after SARS. Over time these animals once again came to feature in dishes in certain areas of China.¹²⁸²

FEBRUARY 2020: JOURNALIST LI ZEHUA **DISAPPEARS** IN WUHAN

When citizen journalist Chen Qiushi vanished on February 6 after posting videos online reporting on the conditions he observed in Wuhan, Li Zehua, a former journalist at the state-run broadcaster CCTV, was inspired to travel to Wuhan to continue Chen's work. Li's investigative reports included videos in which he disguised himself as an applicant looking for employment at crematoriums in Wuhan in order to meet with recruiters and gather evidence of the actual death toll, which well exceeded official claims.¹²⁸³ On February 26, after posting a video online in which he had visited the campus of the WIV, Li livestreamed as he was being chased in his vehicle by state security agents. He went missing thereafter.¹²⁸⁴ Li resurfaced about two months later (April 23) in a video in which he said he had been in "quarantine" for visiting "sensitive epidemic areas," which was likely a veiled reference to the WIV.¹²⁸⁵ Details of Li's current conditions were unknown at the time of writing, as he has stayed out of the public eye since April 2020.¹²⁸⁶

FEBRUARY 2020: **DISINFORMATION CAMPAIGN** BEGINS TO PLACE ORIGIN OUTSIDE OF CHINA

On February 27, Zhong Nanshan, the octogenarian respiratory disease specialist who came out of retirement to advise the NHC on its response to COVID-19,¹²⁸⁷ and who was the first official to acknowledge person-to-person transmission on January 20,¹²⁸⁸ started sowing seeds of doubt around the origin of SARS-CoV-2. Other PRC officials would continue to nurture those seeds for many months to come by repeatedly suggesting that the outbreak did not begin in China. Zhong told a press conference held in Guangzhou municipality: "Though COVID-19 was first discovered in China, it does not mean that it originated in China." He went on to add: "This is a human disease, not a national disease."¹²⁸⁹

MARCH 2020: XI VISITS PLA AMMS, **LINKS** INFECTIOUS DISEASE TO BIOSAFETY RISKS

On the afternoon of March 2, Xi Jinping visited the headquarters of the PLA AMMS in Beijing to inspect its research work on combatting the pandemic. Xi's remarks to the AMMS were not published, either in whole or in part, but a few details of Xi's visit were

discussed in an official Xinhua report on March 2¹²⁹⁰ and a March 15 Qiushi report of his remarks to Tsinghua University later that same day.¹²⁹¹ Xi listened to reports on the progress of AMMS research, including drug discovery and the development of vaccines and antibodies. AMMS officials described the academy's ongoing research on the pathology and transmission mechanisms of the novel coronavirus as well as development of rapid testing for the virus.

Xi Jinping emphasized that technology would be the key to improving the rate of recovery from infection, reducing the mortality rate, and ultimately overcoming the virus. He praised the AMMS for its compliance with the demands of the CCP Central Committee and the Central Military Commission and expressed hope that the AMMS would succeed at quickly and safely developing a vaccine. Xi also told the AMMS that the battle against the coronavirus was an opportunity to develop indigenous innovation and intellectual property pertaining the key and core technologies.

Later that same afternoon on March 2, Xi delivered remarks to a roundtable of experts at Tsinghua University, which were reported by Qiushi. He mentioned the AMMS visit during his remarks and some of the content may have also been discussed at AMMS. Xi made some interesting comments about tracing the origin of the pandemic, suggesting that the task might prove too arduous and fail to yield clear answers:

Research into the origin of the virus and its routes of transmission must be planned as a whole to gain clarity on where this virus came from and where it is going. Exactly as the experts have said, this time the virus causing the pandemic has proven to be very cunning, and it is very difficult to trace its source. At the same time, the development of new technologies provides new means for tracing the source of viruses, [such as] using the binding characteristics of viral proteins and different [cellular] receptors to assess the possibility that suspected animals could be the intermediate host, and using artificial intelligence, big data, and other new technologies to carry out epidemiological and tracing surveys to improve accuracy and screening efficiency. Research on tracing the origin of the virus and its transmission routes is critically important to the prevention and control of the entire pandemic, and we must put all of our energy into understanding it.¹²⁹²

Xi also continued to stress his view that national security is inseparable from biosecurity/biosafety: "Major infectious diseases and biosafety/biosecurity risks

constitute serious risks and challenges to national security, national development, and to the overall stability of society. We must make biosecurity/biosafety an important part of a holistic approach to national security, adhering to the integration of peacetime and wartime [efforts], the integration of prevention and emergency response, and the integration of scientific research and medical treatment and prevention....”¹²⁹³ Among the areas for capacity building, Xi pointed to “improving early warning and forecasting mechanisms for epidemic prevention and control, timely and effective information gathering, and timely adoption of countermeasures.”¹²⁹⁴ Xi also continued to reiterate his call for indigenous innovation in key and core technologies in order to reduce China’s dependency on international suppliers, an expectation that the CCP has continually impressed upon the state-run CAS, including the WIV:

It is necessary to improve the new nationwide system for tackling key and core technologies, accelerate the deployment of scientific research forces in the fields of population health and biosecurity/biosafety, integrate national key scientific research systems in the life sciences, biotechnology, medicine, health, medical equipment, and other fields...[,] strengthen basic research in the fields of the life sciences and make breakthroughs in key and core technologies in medical health.... It is further necessary to speed up efforts to address the shortcomings in our country's high-end medical equipment, speed up research on key and core technologies, break through the bottlenecks with these types of technical equipment, and realize [the goal of] independent control of high-end medical equipment.¹²⁹⁵

MARCH 2020: POLITICAL SCREENING PROCESS FOR SCIENTIFIC PUBLICATIONS IS FORMALIZED

On March 3, the PRC State Council issued a confidential directive to all agencies and offices involved in the R&D response to the pandemic called the “Notice on the Standardization of the Management of the Release of Findings and Information from the Scientific Research Offensive Campaign against the Novel Coronavirus Pneumonia.”¹²⁹⁶ It announced the formation of a task force under the State Council that would screen scientific papers and other publications related to SARS-CoV-2 and COVID-19 before they could be released. It bore the marking “not to be made public.”¹²⁹⁷ A general prohibition against sharing information related to the novel coronavirus without state authorization was contained in a confidential circular issued by the NHC on January 3.¹²⁹⁸

This State Council directive not only raised the level of authority (NHC is subordinate to the State Council) behind that prohibition and doubled down on it, but also formalized its application specifically to research papers by requiring scientists and others not under NHC's purview to seek approval from the State Council's task force prior to publication. This directive was reportedly ordered directly by Xi Jinping.¹²⁹⁹

The scope of the directive was sweeping. It applied to all research and information related to the coronavirus, but singled out information potentially related to its origin as a specific concern:

All publication work on epidemic prevention research and information related to the novel coronavirus, including therapeutic drugs, vaccines, the origin of the virus, the transmission routes of the virus, testing reagents, and so on, will be incorporated into the unified deployment of the Joint Prevention and Control Mechanism of the State Council's Scientific Research Group for the Offensive Campaign Against the Novel Coronavirus Pneumonia Epidemic (thereafter the scientific research group). The scientific research group is charged with overall planning and coordination of the publication of information and findings from the emergency offensive campaign and will direct and coordinate the release of information on scientific research by all work units in all locations.¹³⁰⁰

In case that was not clear enough, the directive raised the level of specificity: "During the period of epidemic prevention and control, all universities, research institutions, medical institutions, [state-owned and private] enterprises, and their personnel shall not arbitrarily publish information on scientific research findings related to epidemic prevention and control without [State Council] approval."¹³⁰¹

The heavy political overlay of the process was evident in its placement of the CCP's propaganda apparatus in charge of communicating findings to the public and its requirement that research results be released exclusively through official channels before submission to professional journals: "In principle, the first public release of research findings and information related to the novel coronavirus pneumonia should be in the authoritative form of an official government release. The special group on public opinion should strengthen communication with the propaganda team, integrate the dynamic state of public sentiment and concerns of society [into their work], and strengthen guidance of the publication of scientific research and information."¹³⁰² The directive

closed with a warning to those who failed to heed its requirements: “Those who fail to apply for approval in accordance with the prescribed procedures, and instead release false scientific research findings and information that have not been verified, thereby causing serious adverse social effects, will be held accountable.”¹³⁰³

MARCH 2020: ORIGIN DISINFORMATION CAMPAIGN KICKS INTO FULL GEAR

Starting in March and continuing for months to come, PRC officials intensified their efforts to sow doubt about the origin of the novel coronavirus, suggesting repeatedly that the origin may not be found in China, or that it was brought to China from abroad, and casting aspersions on those who asked questions about whether a research-related incident could have caused the initial outbreak. On March 4, Zhao Lijian, a spokesman for the PRC Ministry of Foreign Affairs, said at a press conference: “It is highly irresponsible for [sections of the] media to dub it the ‘China’s virus.’ We firmly oppose that [as] no conclusion has been reached yet on the origin of the virus, as relevant tracing work is still underway. We should focus on containing it and avoid stigmatizing language toward certain places.”¹³⁰⁴

On March 12, both Zhao Lijian and Hua Chunying, Zhao’s boss at the Ministry of Foreign Affairs, stepped up the rhetorical campaign to shape the international narrative around the pandemic, much of which took place on Twitter, a social media platform that is banned in China. The pair called it “absolutely wrong” to identify the novel coronavirus with China, and seized on comments made by Robert Redfield, then director of U.S. Centers for Disease Control and Prevention, to the effect that some early COVID-19 cases were likely misdiagnosed as influenza, to argue for a U.S. origin. Zhao went on to plant the false notion that the U.S. military brought the virus to Wuhan during the Military World Games in October 2019.¹³⁰⁵

MARCH 2020: FAMOUS TYCOON DISAPPEARS AFTER CRITICIZING XI’S RESPONSE TO OUTBREAK

On March 6, an article written in the name of Ren Zhiqiang was circulated online. Ren is a close, lifelong confidant of Vice President Wang Qishan and a billionaire real estate tycoon with a reputation for a straight-talking manner who hails from a CCP princeling family. Ren had more than 37 million followers on the Chinese social media platform called Weibo at the time. The article criticized Xi Jinping’s performance at the February

23 national teleconference that he held with 170,000 cadres and military personnel and described Xi as a “clown stripped naked who still wants to be the emperor.”¹³⁰⁶

On March 13, Ren’s friends said that he had “vanished,” and on April 7, the Beijing Municipal Commission for Discipline Inspection announced that Ren was under investigation for “serious violations of law and discipline.”¹³⁰⁷ This was not the first time that the outspoken Ren, who is nicknamed “Cannon Ren,” had dared to criticize Xi in public. In 2016, government censors blocked Ren’s social media accounts after he said that since the state-owned media are funded by the taxpayers, they should serve the taxpayers, not the CCP – a comment that was in direct opposition to Xi’s renewed campaign to further strengthen party control over the media.¹³⁰⁸

MARCH 2020: VICE PREMIER VISITS WUHAN, RESIDENTS SHOUT “FAKE! FAKE! IT’S ALL FAKE!”

On the morning of March 6, Vice Premier Sun Chunlan visited a residential community called the Kaiyuan Gongguan Estate located in the Qingshan District of Wuhan to inspect the work of local officials charged with the distribution of daily necessities to households in a city under strict lockdown. As Sun walked with local officials through a courtyard between residential buildings, quarantined residents shouted from windows above: “Fake! Fake! It’s all fake,” referring to official claims about the state of the outbreak and the services and goods being provided to residents.¹³⁰⁹ According to state broadcaster CCTV, Sun held a meeting with local officials immediately after the incident in order to deal with the complaints.¹³¹⁰

MARCH 2020: SHI ZHENGLI AGAIN DENIES SARS-COV-2 IS “MAN-MADE”

On March 9, one day before Xi Jinping visited Wuhan, the leading coronavirus expert at the WIV, Shi Zhengli, participated in a live webcast in which she once again denied that SARS-CoV-2 was “man-made.” Shi further claimed that the Pro-Arg-Arg-Ala amino acid insert found in the furin cleavage site of SARS-CoV-2 could be found in other bat coronaviruses, which she suggested disproved the lab leak hypothesis.¹³¹¹ Southern Metropolis Daily in Guangzhou Municipality ran a story the same day citing Chinese scientists who questioned Shi’s claim and asserted that the molecular structure of SARS-CoV-2 revealed traces of an “artificial insertion.”¹³¹² The polybasic furin cleavage site found in the spike protein of SARS-CoV-2 is widely regarded by virologists as the virus’

most intriguing molecular feature, and contrary to Shi's claim, such a site has never been observed in another SARS-related coronavirus of the sarbecovirus lineage.¹³¹³

MARCH 2020: XI JINPING VISITS WUHAN (AND WIV?) FOR FIRST TIME SINCE THE OUTBREAK

On March 10, Xi Jinping visited Wuhan for the first time since the PRC authorities acknowledged the pneumonia outbreak in late December. The segments of his itinerary that were disclosed to the public included a morning visit to the Huoshenshan Hospital, which was reportedly constructed by the PLA in just 10 days in January, where he talked with medical staff who were dressed in military uniforms, and a stop by a residential community to talk with CCP volunteers on the street. Xi reportedly waved to the residents who were quarantined in their buildings.¹³¹⁴ Xi declared that Wuhan had turned a corner: "There has been a promising turn in epidemic containment in Hubei and Wuhan, and we've achieved important interim results."¹³¹⁵

What may have been the most significant segment of Xi's visit is the one that may have been omitted from public reporting. On March 6, a newspaper in Hong Kong, citing a source in Beijing, reported that Xi would soon travel to Wuhan, and that his itinerary would include an "inspection" of the WIV, a visit to a local hospital, and a stop at a residential community.¹³¹⁶ State-owned media reports of Xi's actual visit highlighted his stops at a hospital and a residential community, but made no mention of an inspection of the WIV. We do not know if the inspection occurred and was omitted from reporting, or if it was removed from Xi's schedule. Readers will recall that Xi had last traveled to Wuhan to attend the opening ceremony of the Military World Games on October 19, 2019,¹³¹⁷ which is also when rumors of a deadly new virus in Wuhan began to spread among Chinese officialdom.¹³¹⁸

MARCH 2018: CENSORS DELETE WUHAN DOCTOR'S INTERVIEW WITH CHINESE MAGAZINE

On March 10, Dr. Ai Fen, the director of the emergency room at the Wuhan Central Hospital, gave an interview to a Chinese magazine called Renwu in which she described how officials silenced and reprimanded her for "spreading rumors" after she shared with her colleagues and the health authorities a diagnostic report showing a patient with a SARS-like coronavirus in late December. Officials told Ai not to say anything to anyone, not even her husband, and to instruct all the staff in her department to not disclose

anything about the virus either.¹³¹⁹ Censors quickly deleted the article from the magazine's website and social media, though an archived version of the article was saved before it disappeared.¹³²⁰ "I am not a whistleblower," Ai told Renwu. "I am the one who provided the whistle."¹³²¹ In the interview, Ai used the word "regret" several times regarding her decision to stay quiet after being reprimanded, especially as she later lost coworkers to the disease: "If I knew then what I know now, I wouldn't have cared whether he [the official] criticized me or not, I would have [expletive] shouted it from the mountain top! You know what I mean?"¹³²²

MARCH 2020: CLINICAL TRIALS BEGIN FOR VACCINE DEVELOPED BY PLA WORKING AT THE WIV

On March 16, less than a week after Xi Jinping visited Wuhan, the PRC announced that clinical trials had begun on the genetically engineered recombinant adenovirus vaccine developed by the research team of Major General Chen Wei of the Institute of Bioengineering at the PLA AMMS, who had taken over the WIV in January, and CanSino Biologics Inc.¹³²³ For clinical trials to commence less than two months after Chen reportedly arrived in Wuhan to take charge of the vaccine development project at the WIV, preliminary work on the vaccine must have begun much earlier, almost certainly in 2019 before the outbreak was even acknowledged. Experts consulted for this study assessed that a minimum of two months would be needed to build Chen's vaccine construct before it could be ready for testing in animals, which obviously must precede clinical trials. Such a timeline strongly implies a start date in 2019.

As early as March 4, reports had started circulating on the Chinese web that Major General Chen Wei had developed a vaccine.¹³²⁴ Pictures of vaccine vials published by the PLA Daily showed a label that indicated a production date of February 26,¹³²⁵ and yet Chen supposedly only arrived in Wuhan sometime between January 26 and January 31.¹³²⁶ Needless to say, the notion suggested by the PRC authorities that vaccine development work only began sometime in late January, and yet vials of vaccine were already being produced by February 26, strains credulity, even in emergency conditions with researchers working around the clock.

MARCH 2020: PUBLIC HEALTH OFFICIAL AND CCP MEDIA AGAIN SUGGEST ORIGIN **OUTSIDE** OF CHINA

During a press conference on March 18, veteran respiratory specialist Zhong Nanshan repeated the claim that the discovery of the novel coronavirus in Wuhan did not necessarily mean that that virus originated in Wuhan or was first introduced to the human population there.¹³²⁷ Readers will recall that Zhong first made this claim in public on February 27.¹³²⁸ On March 21, the CCP-owned tabloid paper Global Times ran a story on an interview that Italian scientist Giuseppe Remuzzi had given to National Public Radio on March 19, in which he revealed that medical practitioners in Italy had observed severe pneumonia cases in November 2019 prior to the outbreak being revealed in China.¹³²⁹ Global Times misconstrued Remuzzi's comments as suggesting that both the origin of the virus and the site of the initial outbreak were outside of China. Remuzzi later told the Italian newspaper Il Foglio: "There is no doubt that the virus is Chinese. This is a textbook example, to be taught in universities, on how scientific information can be manipulated for propaganda reasons."¹³³⁰

MARCH 2020: **DISHONEST REPORTING** SCHEME LEADS TO "NO NEW DOMESTIC CASES"

On March 19, PRC authorities trumpeted a victory in the battle against the coronavirus by claiming that no new locally transmitted cases were reported on that day anywhere in China, a first since the pandemic began.¹³³¹ However, a notice posted by local authorities outside a Wuhan residential community on March 19 indicated a new confirmed case lived inside the compound. After a photo of the notice went viral online, questions were raised about why this case was not being recognized in Beijing's official case tally.

Tao Zhengtai, a local CCP leader, later confirmed that the announcement was indeed posted by the relevant authority, but Tao called it a mistake because it referred to a 63-year-old man surnamed Zhang who lived in Wuhan's Qiaokou district, and who had tested positive, but had displayed no symptoms. "Mr. Zhang is asymptomatic, not a confirmed case," Tao told Xinhua.¹³³² Qiaokou District authorities who were responsible for posting the announcement also issued a statement saying even if Zhang's nucleic acid test result was positive, "his case should not be classified a confirmed case," in accordance to the guidelines issued by the NHC.¹³³³ This response by local officials confirmed that one of the ways that central authorities concealed the severity and scope of the outbreak was by excluding asymptomatic, pre-symptomatic, and mildly

symptomatic cases altogether from official data, even when they had tested positive for the virus.

MARCH 2020: FORTUNE OR FOREKNOWLEDGE? VACCINE MAKER'S STOCK RISES IN FALL 2019

On March 21, Wang Hao, a Chinese economist based in Taiwan, posted an analysis on social media of a peculiar pattern in the stock prices for CanSino Biologics, Inc. This is the vaccine manufacturer that partnered with the PLA AMMS to develop the recombinant adenovirus vaccine for which Beijing was trumpeting the commencement of clinical trials on March 16. Wang found that the price of the company's stocks had fluctuated at roughly HK\$30.00 from the time of its initial listing in March 2019 until it started climbing quickly in October 2019,¹³³⁴ which was shortly after the WIV's removal of its online database of pathogens,¹³³⁵ its issuance of a tender for a major renovation of its central air conditioning system,¹³³⁶ and its participation in a "drill" held at the Wuhan Tianhe International Airport involving the response to a "novel coronavirus."¹³³⁷ By December 2019, the stock of CanSino Biologics had nearly doubled in value, and by March 2020, the price of CanSino Biologics stock had increased to HK\$127.00, or more than quadruple its average before September 2019.¹³³⁸

The sudden and apparently inexplicable rise in CanSino Biologics' fortune prompted Wang Hao to ask an obvious question: "Who was buying CanSino Biologics stocks in November 2019?" He discovered that one of the four controlling shareholders of CanSino Biologics became a member of the Chinese People's Political Consultative Conference in March 2018.¹³³⁹ Coincidentally or not, Yuan Zhiming, the director of the Wuhan National Biosafety Laboratory, is also a member of the conference.¹³⁴⁰ In any case, Wang Hao also pointed out that because it takes about five-to-six months on average to produce vaccines that are ready for clinical trial, it is likely that Major General Chen and her partners at CanSino Biologics "started developing a vaccine after the Wuhan drills in September 2019."¹³⁴¹

MARCH 2020: PRINCELINGS CALL ON CCP TO CONVENE TO "DISCUSS THE PROBLEM OF XI JINPING"

On March 21, Chen Ping, a Shanghainese CCP princeling, reform advocate, and chairman of Sun TV in Hong Kong, shared on his WeChat social media account an anonymous letter from fellow CCP princelings that criticized the leadership of Xi Jinping, both as it

pertained to the coronavirus outbreak as well as a litany of his prior mistakes, and called for an enlarged meeting of the Politburo to be held to “discuss the problem of Xi Jinping.”¹³⁴² The letter stressed that such a meeting was “no less important” than the historic meeting that the CCP convened in 1979 to oust the “Gang of Four” and end the Cultural Revolution, and would be “much more important” than the CCP plenum where Deng Xiaoping rolled out the era of “reform and opening,” the policy that led to China’s three-plus decades of economic growth.¹³⁴³

APRIL 2020: LOCKDOWN IS **LIFTED** IN WUHAN, WET MARKETS BACK IN BUSINESS

On April 8, the authorities lifted the strict lockdown in Wuhan that had been first imposed on January 23, and once again allowed movement into and out of the city. While some restrictions and mitigation measures remained in place, April 8 marked the end of the most draconian measures and the return of some degree of normalcy in which shuttered businesses could once again operate and transportation links were restored.¹³⁴⁴ While the Huanan Seafood Market, the site of an early cluster of COVID-19 cases, remained closed, media reports indicated that other wet markets in Wuhan, including its largest, called Baishazhou, were allowed to immediately reopen on April 8, while vendors at some local wet markets reported that they had never closed during the lockdown period and were unaware of any new regulations of wet markets rolled out since the beginning of the outbreak.¹³⁴⁵ A week earlier, journalists observed wet markets elsewhere in China that were also operational and open to the public, including those that were selling live exotic species in the two major cities of Guilin in Guangxi Zhuang Autonomous Region and Dongguan in Guangdong Province.¹³⁴⁶

Readers will recall that on February 24, just a month and a half before the lockdown in Wuhan was lifted, the NPC Standing Committee imposed a “full ban” on illegal wildlife trade, which would entail “completely prohibiting” the hunting, trading, and transportation of terrestrial animals that naturally grow and breed in the wild for the purpose of consumption. It also prohibited the consumption of terrestrial wild animals “of important ecological, scientific, and social value” that are under state protection as well as other terrestrial wild animals, including those that are bred or reared in captivity.¹³⁴⁷ The laxity of local officials in enforcing this new ban and the apparent lack of awareness among wet market vendors that new regulations had been promulgated at all suggests that the authorities’ regulatory efforts in this regard were more perfunctory than not. That lack of seriousness also stood in stark contrast to the clear and consistent

acts of regulatory muscle that the party-state was putting into strengthening biosafety practices at laboratories starting in the fall of 2019 and continuing well into 2021.

APRIL 2020: AUTHORITIES **ARREST** MEN FOR ARCHIVING INFORMATION RELATED TO EARLY OUTBREAK

On April 19, public security agents detained Chen Mei, a 27-year-old NGO worker who had been archiving and reposting online articles that had been censored pertaining to the early outbreak of COVID-19 in China. He and his friend Cai Wei were charged with the political crime of “picking quarrels and provoking trouble.”¹³⁴⁸ Some of the materials archived and reposted by the two men, such as investigative reporting by Caixin and interviews with Wuhan doctors Li Wenliang and Ai Fen, are featured in this report. To combat PRC state censorship, Chen and Cai created “Terminus 2049,” a crowd-sourced repository for sensitive articles, in 2018 using GitHub, the world’s largest open-source website, favored by many software developers for the ease with which it allows code sharing and collaboration.¹³⁴⁹

In August 2021, the Chaoyang District People’s Court in Beijing sentenced Chen Mei and Cai Wei to 15 months in prison for their COVID-19 work related to Terminus 2049.¹³⁵⁰ It is interesting that the authorities punished Chen and Cai for archiving and reposting reports pertaining to the novel coronavirus outbreak, but they did not take such action when the duo was doing similar work focused on other censored topics from the time of the launch of Terminus 2049 in 2018 and throughout 2019. This fact suggests that the party-state perceived a higher degree of political risk from allowing unofficial and uncensored reporting of its handling of the COVID-19 outbreak to circulate among Chinese netizens – a risk that exceeded those posed by other routinely censored topics in China.

APRIL 2020: XI **SACKS** SECURITY VICE MINISTER FOR DISLOYALTY, COVID-RELATED ACTIONS

On April 19, the CCP Central Commission for Discipline Inspection announced that it had placed Sun Lijun, the vice minister of public security, under investigation for “serious violations of law and regulations.”¹³⁵¹ Another commission report published in January 2021 gave additional details on Sun’s case that indicated Sun’s transgressions were not merely a matter of corruption, but more importantly, involved political disloyalty. The report said that Sun was among a group of “two-faced people who were

disloyal and dishonest to the Party.”¹³⁵² Such language is used to signify factional infighting inside the CCP. Given Xi Jinping’s elevated and unrivaled status as the “core” leader of the party, it strongly suggested that Sun was being accused of conspiring to undermine Xi. Sun Lijun was affiliated with one of Xi’s rival factions in the CCP, loyalists of the former top leader Jiang Zemin, many of whom have worked in or hail from Shanghai.¹³⁵³

Later state media reporting elaborated on the political disloyalty aspect of Sun’s misconduct. On September 30, 2020, the official Xinhua News Agency reported that Sun had been formally expelled from the Communist Party.¹³⁵⁴ It accused Sun of a number of alleged crimes and violations of political discipline: “In order to achieve his own personal political goals, [Sun] used unscrupulous means and played underhanded tricks, created gangs and recruited people to form factions inside the party, cultivated his own personal forces, formed interest groups that took on the posture of gangs to seize control of critical departments, [thereby] seriously undermining the unity of the party and severely harming political security.”¹³⁵⁵

For the purposes of this study, it is worth considering the curious fact that Xinhua was also allowed to publish in its Chinese reporting the following description of Sun Lijun’s alleged misconduct related to Beijing’s response to the novel coronavirus outbreak: “In the fight against the novel coronavirus pneumonia epidemic [Sun] abandoned his frontline post without permission and privately collected and released a large amount of classified materials....”¹³⁵⁶ Prior to the announcement of his arrest, Sun was last seen in public escorting Xi Jinping as he visited Wuhan on March 10.¹³⁵⁷ One unofficial account of Sun’s crimes claims that he shared notes of his observations in Wuhan of the party’s handling of the outbreak to his Sydney-based wife, which were intercepted by Australian intelligence agencies.¹³⁵⁸

Sun Lijun was not the first senior official from the Ministry of Public Security to be sacked by Xi Jinping. Xi has exhibited strong suspicion towards his domestic security apparatus throughout his time at the helm of the party-state. Xi oversaw the sacking and arrests of former Vice Minister of Public Security Li Dongsheng in February 2014,¹³⁵⁹ former czar of internal security and Politburo Standing Committee member Zhou Yongkang in December 2014,¹³⁶⁰ and Vice Minister of Public Security (and Interpol Chief) Meng Hongwei in September 2018.¹³⁶¹ In October 2021, Minister of Justice Fu Zhenghua,

another former Vice Minister of Public Security, would also be arrested for allegedly being in cahoots with Sun.¹³⁶²

APRIL 2020: TWO PLA STUDIES SUGGEST WORK ON COVID-19 VACCINE **PREDATED** OUTBREAK

In April, several members of the same predominately PLA AMMS research team led by Zhou Yusen that filed China's first patent for a COVID-19 vaccine on February 24 submitted two papers for publication in academic journals that provided further insight into the research process that produced the vaccine. On April 14, 23 researchers led by Zhou, 11 of whom worked for the PLA AMMS, submitted a paper titled, "A Mouse Model of SARS-CoV-2 Infection and Pathogenesis."¹³⁶³ The team used genetic editing, specifically what is called CRISPR/Cas9 knockin technology, to create mice that expressed the human ACE2 receptor in order to test how the genetically modified mice, as a proxy for humans, would respond to exposure to the virus. They demonstrated that both young and aged mice with human ACE2 sustained higher viral loads in their lungs, trachea, and brains upon intranasal infection than wild-type mice similarly exposed. Interstitial pneumonia and elevated cytokines were also observed in SARS-CoV-2 infected-aged hACE2 mice.¹³⁶⁴

The research team concluded that the mouse model they developed had proven useful for evaluating COVID-19 vaccines and therapeutics,¹³⁶⁵ which suggests that the study was conducted as part of the effort to develop the vaccine for which they filed a patent application on February 24. Experts consulted for this report assessed that the experiment described in "A Mouse Model of SARS-CoV-2 Infection and Pathogenesis" could have been completed within four weeks under the best circumstances, including the immediate availability of the mice expressing the human ACE2 receptor. If the process to acquire these mice were slow, or if the mice had to be bred, the timeline would have been much longer. A conservative estimate would then place the beginning of the research for this paper no later than mid-January.

On April 29, however, a research team led by PLA virologist Zhou Yusen submitted another closely related research paper to the journal Science titled "Adaptation of SARS-CoV-2 in BALB/c Mice for Testing Vaccine Efficacy." The paper was resubmitted a month later on May 29 and published online on July 30.¹³⁶⁶ This companion paper to "A Mouse Model of SARS-CoV-2 Infection and Pathogenesis" revealed a much longer

research timeline. As the vaccine patent filed by Zhou's team on February 24 had initially done, this study further provided a window into a timeline of research that almost certainly began well before the official acknowledgment of an outbreak of "pneumonia of unknown cause" on December 31, 2019. Zhou's research team consisted of 32 researchers in total, 26 of whom worked directly for the AMMS or other PLA institutions.¹³⁶⁷ Nine of the 11 researchers who submitted the COVID-19 vaccine patent with Zhou on February 24 were coauthors of this study.¹³⁶⁸

Experts consulted for this report assessed that the four experiments described in the "Adaptation of SARS-CoV-2 in BALB/c Mice for Testing Vaccine Efficacy" would have required a minimum of 18 weeks of focused work, or almost five months, to complete. A conservative estimate would then place the beginning of Zhou's vaccine work no later than November 2019. It is also worth noting that Zhou's team had to possess a sequence of the coronavirus in order to develop the receptor binding domain vaccine, which strongly suggests that they already had the sequence when they commenced the work.

To acquire a basic appreciation of the timeline involved, consider the fact that the research conducted for this study required the use of BALB/c mice that were subjected to serial passage (seven to be precise) with SARS-CoV-2 in order to adapt and validate the virus to the mouse. This process alone would have taken a minimum of four weeks, experts assessed. The process to subsequently develop a candidate vaccine that can fuse to human antibodies would take four additional weeks at least. The mice must be immunized at two-week intervals with sera collected from the mice for testing four weeks after initial immunization. The mice would then be challenged two weeks after they had received the last dose of vaccine. The results can finally be assessed seven days later. Several further steps would be needed thereafter to complete the requisite science described in the patent application, which would likely add a few more days to the process.

MAY 2020: STUDY SHOWS UNUSUALLY STRONG BINDING OF SARS-COV-2 TO HUMAN CELLS

On May 13, a team of Australian and British scientists led by veteran virologist Nikolai Petrovsky released a pre-print of a study comparing the binding affinity of the spike protein of SARS-CoV-2 to the ACE2 receptor in human cells with the same receptor taken from different species. What they found was surprising: the spike protein of SARS-

CoV-2 exhibited the highest binding to the ACE2 receptor of human cells of all the species tested, which included a wide range of species, from those thought to be potentially involved in first transferring SARS-CoV-2 to humans (bat, snake, pangolin) to those reported to be susceptible or resistant to SARS-CoV-2 infection (tiger, mouse, ferret, hamster, civet, monkey) as well as agricultural and companion animals (cow, horse, cat, and dog).¹³⁶⁹ “This finding was surprising as a zoonotic virus typically exhibits the highest affinity initially for its original host species, with lower initial affinity to receptors of new host species until it adapts,” the authors explained.¹³⁷⁰

Scientists have speculated that the original reservoir species for SARS-CoV-2 could be horseshoe bats because bats are known to carry many coronaviruses, but the Australian and British team found that SARS-CoV-2 binds rather poorly to ACE2 receptors in bats. It also binds so poorly to palm civet ACE2 (the intermediary host for SARS-CoV-1) that the authors concluded that palm civets could be ruled out as an intermediary candidate for SARS-CoV-2. “To date, a virus directly related to SARS-CoV-2 has not been identified in bats or any other non-human species, leaving its origins unclear,” the team noted.¹³⁷¹

The fact that the spike protein of SARS-CoV-2 is unusually optimized to bind to human ACE2 receptors is a significant finding that continues to beg for an explanation. In the words of the authors, “There are currently no explanations for how or where such a transition could have occurred to generate a SARS-CoV-2 spike protein optimized for human ACE2.”¹³⁷² The team’s findings boosted the plausibility of a research related origin, as it highlighted oddities of the novel coronavirus that remain difficult to explain on the basis of what is known about how coronaviruses recombine and mutate in nature. In other words, it raised the possibility that the virus was artificially modified in a laboratory to enhance its transmissibility to humans. The implications of these findings received a cold reception in an international scientific community that was engaging in uncharacteristic groupthink on the origin question. As a result, it took more than a year from the release of the preprint before a journal formally published their study, even as other COVID-19 related studies were being rushed through the process and into print.

MAY 2020: CHINA REPORTS NO NEW CORONAVIRUS CASES FOR THE FIRST TIME SINCE JANUARY

On May 23, the NHC reported no new cases – locally transmitted or imported – for the first time since it began to acknowledge coronavirus infections in January. PRC authorities claimed a total of only 84,000 confirmed coronavirus infections nationwide at this point in time, ranking only 13th in the world for total infections. The implausibility of Beijing’s claims became clearer as they stood in stark contrast to reliable data from other countries. The United States, for example, reported 1.6 million infections by that time.¹³⁷³

MAY 2020: WIV DIRECTOR GENERAL DENIES LAB LEAK WAS SOURCE OF OUTBREAK

On May 24, Wang Yanyi, the director of the WIV, gave an interview to the official state English broadcaster CGTN.¹³⁷⁴ CGTN began by inaccurately characterizing the lab leak hypothesis as something foreign when, in fact, Chinese citizens were the first to consider the possibility. CGTN said that “since the outbreak of the pandemic, the outside world has all along had [its own particular] voice and way of speaking” about the origin of the novel coronavirus, and asked Wang what she thought of that line of the argument.¹³⁷⁵ Wang replied:

This hypothesis was a pure fabrication. The Wuhan Institute of Virology first came into contact with [the virus] on December 30 of last year, when it was still a clinical sample called “pneumonia of unknown cause.” Later, after pathogen testing, we found that these samples actually contained a completely new coronavirus that was absolutely unknown before, which is now called the novel coronavirus. We had never been exposed to, studied, or stored this virus before then. In fact, we, like everyone else, did not know this virus even existed. How could we leak something that we never had [in our lab]?¹³⁷⁶

The WIV has offered no documentation to substantiate Wang’s claims about its holdings of viral samples prior to the pandemic, and her claims are completely unverifiable since the WIV took down its relevant online database in September 2019. Even before the database was removed from the public domain, it contained a password protection section specifically for unpublished viral sequences.¹³⁷⁷ In the interview, Wang made another highly questionable claim: namely that Shi Zhengli and her team of researchers had only managed to isolate and culture a total of three bat coronaviruses since they

began this work in 2004, and that those three bore no more than 79.8 percent homology to SARS-CoV-2.¹³⁷⁸

Before it was taken down, the WIV database reportedly contained more than 2,000 entries consisting of sample and pathogen data, including full and partial genomic sequences, collected from bats and mice. The WIV had reportedly collected more than 15,000 samples from bats, from which they had identified over 1,400 bat viruses, including an estimated 100 unpublished sequences of bat beta-coronaviruses – the genre of coronaviruses to which SARS-CoV-2 belongs.¹³⁷⁹ Wang’s claim that this vast body of field collection work done by Shi’s team over the course of 16 years produced a catalogue of only three live strains of bat coronaviruses at the WIV simply strains credulity. Moreover, the WIV works on classified projects for the PLA and government entities.¹³⁸⁰ One can only presume that the WIV would not be left at liberty to admit to viral holdings that were the subject of classified work.

MAY 2020: GEORGE GAO DECLARES WUHAN MARKET NOT THE SOURCE OF THE OUTBREAK

On May 26, George Fu Gao, the director-general of the CCDCP, gave an interview to the CCP-run tabloid paper the Global Times in which he ruled out the Huanan Seafood Market in Wuhan as the source of original human infection of SARS-CoV-2. Gao said that testing of samples from the market failed to show any links between animals being sold there and the emergence of the novel pathogen.¹³⁸¹ "At first, we assumed the seafood market might have the virus, but now the market is more like a victim. The novel coronavirus had existed long before," Gao reportedly told the Global Times.¹³⁸² Readers will recall that Gao knew this to be the case much earlier, as he had an emotional phone call with Robert Redfield on January 4, in which Gao “became distraught and started crying after finding ‘a lot of cases’ among individuals who had not been to the wet market,” according to Redfield’s account of the conversation.¹³⁸³

Gao’s view has not changed since 2020. In February 2022, a team of 38 of China’s top epidemiologists led by George Gao published a pre-print study examining surveillance data gathered from the Huanan Seafood Market in Wuhan.¹³⁸⁴ Gao’s team analyzed the results from 1,380 samples collected from the environment (923 samples) and from animals in the market (457 samples) in early 2020 and found that 50 of the environmental samples tested positive for SARS-CoV-2.¹³⁸⁵ They concluded that the

presence of SARS-CoV-2 on environmental surfaces was not due to virus-shedding animals being sold in the market but rather the result of infected humans visiting the market. “No virus was detected in the animal swabs covering 18 species of animals in the market,” the team explained.¹³⁸⁶

Gao’s team surmised that “the market might have acted as an amplifier due to the high number of visitors every day, causing many initially identified infection clusters in the early stage of the outbreak,” but they found no evidence that it was the site of original human infection or zoonotic spillover.¹³⁸⁷ Gao’s team further noted “recent studies from different countries suggest that SARS-CoV-2 circulation preceded the initial detection of cases by weeks.”¹³⁸⁸

MAY-JUNE 2020: PLA VIROLOGIST **DIES** UNDER MYSTERIOUS CIRCUMSTANCES

Sometime in late May or early June 2020, Zhou Yusen died under unusual and mysterious circumstances.¹³⁸⁹ Zhou was the virologist and vaccinologist at the PLA AMMS Institute of Microbiology and Epidemiology who collaborated with the WIV on coronavirus research in 2019,¹³⁹⁰ and who lead a team that became the first in China to submit a patent for a COVID-19 vaccine on February 24, 2020.¹³⁹¹ Zhou was reportedly around 54 years old at the time of death and had no known illnesses. No PRC media reports disclosed the cause of his death. In fact, there was no contemporaneous confirmation of his death at all, which is why the exact date of his death could not be established through publicly available sources.

The state-run and party-run media in China, including military media outlets, simply did not acknowledge Zhou’s death. It is highly unusual for the PRC official press, particularly military outlets such as the PLA Daily, to not mark the passing of a decorated PLA scientist, particularly who one had just led a team that developed a vaccine for COVID-19.¹³⁹² Only one Chinese website acknowledged Zhou’s death – a July 31 report on the science website MedSci summarized a study that Zhou and several other PLA researchers published in the English language journal Science on July 30.¹³⁹³ Only a one-word parenthetical note appeared indicating that Zhou was “deceased” in both the Chinese and English reports; no further information was provided.¹³⁹⁴ Members of Zhou’s research team published another study in March 2021 that they dedicated to Zhou: “This article is in memory of Prof. Yusen Zhou for his contributions to the project conception and article design.”¹³⁹⁵

The CCP, its military, and the government of China that it controls, by contrast, not only refrained from marking Zhou's death without explanation, but it appears that they also went to some lengths to erase historical references to him. The aforementioned July 30 report in MedSci could only be found in a cache version online, as the article itself appears to have been removed from the website. All references to Zhou have been removed from the PLA Daily website. All but one reference has been removed from the WIV website.¹³⁹⁶

Zhou's work appears to be an important piece of the puzzle that we seek to solve, and his untimely and mysterious death only underscores the likelihood that he played a role in, or otherwise had direct knowledge of, how the outbreak of SARS-CoV-2 began. As discussed earlier in this report, judging from the methodology used by Zhou's team to develop their recombinant protein vaccine, it is likely that his team would have needed a minimum of three months to carry out their experiments as described and to prepare the patent application for submission by February 24. If this estimate is correct, and it is based on conversations with accomplished vaccinologists, work on Zhou's vaccine began no later than November 2019, perhaps as early as October – well before the authorities disclosed anything about the existence of a novel coronavirus, but precisely within the period in which we have observed signs of heightened official scrutiny of the WIV. Another study that Zhou's team submitted for publication on April 29,¹³⁹⁷ approximately one month before his death, revealed a timeline of related research that likewise appears to have begun long before the official acknowledgment of an outbreak at the end of December 2019.

JUNE 2020: CHINESE SCIENTISTS ASK NIH TO DELETE VIRUS SEQUENCES FROM DATABASE

On an unspecified date in June, researchers based in Wuhan requested that the NIH delete a set of partial genomic sequences taken from early coronavirus cases in Wuhan that had been submitted to a scientific database maintained by the NIH's National Center for Biotechnology Information called the Sequence Read Archive, which is regularly consulted by researchers around the globe. The deletion was requested ostensibly because the sequences had been updated and would be posted elsewhere.¹³⁹⁸ The Chinese scientists did not specify to which database the updated sequences would be posted, and an extensive search by a virologist a year later could not locate the deleted sequences in any other public database, though they had been cited in two papers

produced between the time when the sequences were first submitted to the NIH in March 2020 and their subsequent deletion in June 2020.¹³⁹⁹

Researchers associated with the Renmin Hospital of Wuhan University collected the samples from which the deleted sequences were derived. The pre-print produced by this research team on March 4, 2020, referenced the sequences and indicated that they were derived from “45 nasopharyngeal swab samples from outpatients with suspected COVID-19 early in the epidemic.”¹⁴⁰⁰ Readers will recall that on March 3, just one day prior to the release of this pre-print, the PRC State Council issued a confidential directive to all agencies and offices involved in the R&D response to the pandemic announcing a requirement that scientific papers related to SARS-CoV-2 be screened by a State Council task force before they could be published.¹⁴⁰¹ By the time the final manuscript of the Wuhan University study was published in June, the description of the samples had been changed to add the date “January 2020” in parentheses after the phrase “early in the epidemic,”¹⁴⁰² lest anyone wonder if the samples could have predated 2020.

The possible relevance of the deleted sequences to the question of the origin of SARS-CoV-2 pertains to whether these sequences could reveal more about the initial evolution of the virus than was knowable from the paucity of early sequences released by PRC authorities to date. Experts’ attempts to use the methods of genomic epidemiology, such as phylogenetic analysis of the earliest sequences, to infer the progenitor virus of SARS-CoV-2 have been confounded thus far by the paucity of data from early samples, and an unusual fact pattern that emerged from the small number of available early sequences: the earliest known SARS-CoV-2 sequences, which were mostly derived from the Huanan Seafood Market, are significantly more different from the bat coronaviruses that are universally believed to be the deep ancestors of SARS-CoV-2 than some sequences collected at later dates outside of Wuhan.¹⁴⁰³ The earliest sequences should be the closest in genomic structure to their progenitor. As a virus mutates over time, it gradually becomes more distant from its progenitor, not the other way around.

One clear conclusion that Dr. Jessie Bloom, the virologist who unearthed the deleted sequences was able to draw from them, may suggest why they were deleted in the first place: “The Huanan Seafood Market sequences that were the focus of the joint WHO-China report (WHO 2021) are not representative of all SARS-CoV-2 in Wuhan early in the epidemic.”¹⁴⁰⁴ In other words, the sequences released to the international

community by PRC authorities provided only a partial picture of SARS-CoV-2 as it was circulating in Wuhan in the relatively early days of the outbreak, which were likely not the earliest days of the outbreak.

China is not lacking in facilities capable of conducting genomic sequencing of viruses; the paucity of early data cannot be explained by a capacity issue. The lack of genomic sequences raises questions about whether the PRC authorities released early sequences selectively, and perhaps in a manner intended to manufacture mystery around the origin. Such an effort would explain why the NHC ordered that virus samples be destroyed or transferred to designated storage facilities on January 3.¹⁴⁰⁵ Bloom's assessment of the value of the deleted sequences, which were only partial after all, strongly suggests that had the NHC not destroyed early samples, but rather sequenced their genomes fully and released that information to the international community in a transparent manner, we would likely know far more about the initial outbreak and its origin than we currently do:

The fact that such an informative data set was deleted has implications beyond those gleaned directly from the recovered sequences. Samples from early outpatients in Wuhan are a gold mine for anyone seeking to understand the spread of the virus. Even my analysis of the partial sequences is revealing, and it clearly would have been more scientifically informative to fully sequence the samples rather than surreptitiously delete the partial sequences. There is no plausible scientific reason for the deletion....¹⁴⁰⁶

JUNE 2020: XI JINPING AGAIN SPEAKS OF "SHORTCOMINGS" IN PUBLIC HEALTH SPEECH

On June 2, Xi Jinping once again delivered remarks on the coronavirus pandemic to a roundtable of experts. His remarks were not published until more than three months later on September 15. His remarks continued to demonstrate concern about systematic "shortcomings,"¹⁴⁰⁷ even well after he had declared China's victory in the "people's war" against the virus.¹⁴⁰⁸ Xi also continued to strike a somewhat defensive tone, going out of his way to portray his response to the outbreak as aggressive and decisive.

Interestingly, Xi went so far as to rehash remarks that he made more than two years prior to show that he foresaw the threat long before the outbreak of SARS-CoV-2: "In January 2018, at the opening ceremony of the special seminar to study and carry out the

spirit of the 19th Party Congress, I mentioned 16 risks in 8 areas. Among them, I particularly said, ‘...[We] must also be on the alert for at all times [and] strictly guard against [SARS-like major infectious viruses].’”¹⁴⁰⁹ It appears that the text of this January 2018 speech has never been published in full, and the official summary published by Xinhua on the day that the speech was delivered did not include the quote that Xi cited above.¹⁴¹⁰

Xi continued to reiterate themes that he stressed in February: “Since the outbreak of the epidemic, I have repeatedly proposed that while we must do a good job with epidemic prevention and control, we must also take a long-term perspective, review our experiences, and absorb the lessons. In response to the problems and deficiencies exposed during the course of epidemic prevention and control, we should pay close attention to making up for the shortcomings, patching holes that leak, and fortifying the weak spots.”¹⁴¹¹ Xi described the development of core technologies as a key to combatting infectious diseases, called for more measures to develop scientific talent, and once again drew a link between biosafety and public health:

The major scientific and technological achievements in the areas of protecting human lives, biosafety, and biosecurity are important assets to the nation, which we must hold in our own hands. We need to expand the application of technology in the public health arena, accelerate and improve the integration of wartime and peacetime systems for scientific research offensive campaigns [to support] disease prevention, control, and public health, focus our energy on offensive campaigns to develop core technologies, and continue to increase funding and investments for major disease prevention, to quickly make up for our nation’s shortcomings in the life sciences, biotechnology, pharmaceuticals, public health, and medical equipment. Now, we must bring into effect the advantages of our nationwide system, compete to be the first to successfully develop coronavirus vaccines, and fight to take the strategic lead. We need to deepen the reform of our system and mechanisms for developing scientific research talent, to improve the discovery, cultivation, and incentive mechanisms for innovative scientists of strategic value, attract more talent to join scientific research corps, and create the conditions for them to rise above the others.¹⁴¹²

JULY 2020: ACADEMIC CRITIC OF XI JINPING ARRESTED AND TERMINATED BY UNIVERSITY

On July 6, public security agents in Beijing showed up at the home of Xu Zhangrun, an outspoken professor of law at Tsinghua University, and took him into custody on what his lawyer said was a trumped-up charge of soliciting prostitution in Chengdu. Xu was held for six days before being released.¹⁴¹³ On July 15, the university terminated Xu's employment citing the prostitution charge as well as his publications over the last two years.¹⁴¹⁴

In March 2019, Xu Zhangrun was suspended from his university post and placed under political investigation for an article that he published in July 2018 criticizing Xi Jinping's concentration of power, lifting of terms limits, and unrelenting crackdown on dissent.¹⁴¹⁵ Readers will recall that Xu published an essay online in February 2020 called "When Fury Overcomes Fear," which blamed Xi for the cover-up of the novel coronavirus outbreak.¹⁴¹⁶ It is worth noting that the consequences for Xu's criticism of Xi's response to the novel coronavirus were more severe than his general criticism of Xi's heavy-handed rule.

JULY 2020: NHC ISSUES POLICY "NORMALIZING" BIOSAFETY MEASURES TO "PREVENT LAB LEAKS"

On July 6, the NHC issued a directive that once again framed laboratory biosafety measures as an essential element of China's pandemic response and required that such measures be "normalized" as standard procedure going forward,¹⁴¹⁷ even after Beijing had declared victory in the "people's war" against the coronavirus.¹⁴¹⁸ The directive was titled "Circular on Further Strengthening Monitoring and Management of Laboratory Biosafety in the Normalization of the Novel Coronavirus Pneumonia Epidemic Prevention and Control Efforts."¹⁴¹⁹ Much of the circular's content simply reiterated requirements first spelled out in the "Laboratory Biosafety Guidelines for the Novel Coronavirus" issued on January 23, and the "Notice on Strengthening Biosafety Management of Laboratories [Studying] Zoonotic Pathogenic Microorganisms" issued on February 7, and clarified that those requirements would be "normalized," rather than relaxed, in the post-pandemic era.

For example, the circular echoed the aforementioned guidelines and notice in stipulating that the cultivation of novel coronaviruses (presumably not just SARS-CoV-2) and

animal infection experiments involving novel coronaviruses must be conducted in BSL-3 laboratories or above, and that BSL-3 level PPE must be used even for operations like PCR testing that may be performed in a BSL-2 setting.¹⁴²⁰ Readers will recall that the WIV did much of its coronavirus work in BSL-2 laboratories.¹⁴²¹

The circular ordered all of the health commissions of the 31 provincial-level jurisdictions in China to strengthen their regulation and oversight of BSL-3 and BSL-4 biosafety laboratories using NHC-issued rules and guidelines as the basis. Local level health commissions were required to raise biosafety awareness as a general matter and to train laboratories on the correct operational procedures and experimental techniques and the proper use of PPE and disposal of samples. It further required them to proactively provide technical guidance to laboratories in their jurisdictions on conducting PCR testing for novel coronavirus infections in order to “upgrade their testing capabilities and guarantee the safety of testing personnel and the surrounding environment.”¹⁴²²

Reaffirming the central concern expressed in the two directives from January and February, the NHC circular from July likewise spilled the most ink on the subject of properly managing the storage and transport of viral strains and samples: “All health commissions at the local level should strictly manage strains of the novel coronavirus and related samples based on the law and regulations to ensure safety and security.”¹⁴²³ “All provincial-level health commissions must strengthen their supervision and management of work units that store viral strains and related samples,” the circular added, “Strictly prevent and put an end to the occurrence of unauthorized transport [of viral samples].”¹⁴²⁴ It further specified stricter transport safety requirements for samples taken from groups deemed to be at higher risk of infection by the authorities.¹⁴²⁵

The circular charged provincial health commissions, not the frontline research institutions, with the responsibility of deciding whether to store or destroy samples of the novel coronavirus:

In accordance with the needs of pandemic prevention and control and requirements related to laboratory biosafety, all provincial health administrative departments should make timely determinations and issue opinions on the disposal of biological samples of the novel coronavirus tested in laboratories. For materials that need to be stored, health commissions shall designate as soon as possible the facilities that meet storage conditions to store samples in a relatively

concentrated manner or transfer them to national level bacterial and viral storage centers to be stored. For materials that do not need to be stored, the relevant organizations should follow the requirements for biosafety to dispose of them in a timely manner.¹⁴²⁶

It also imposed reporting requirements for laboratories that isolate the virus:

All provincial health administrative departments are requested to urge the high-level biosafety laboratories within their jurisdiction to report the isolation, sharing of, and related activities involving novel coronavirus strains to the Science and Education Department of the Commission in a timely manner, and at the same time, instruct laboratories that isolate strains of the novel coronavirus to apply to the National Bacterial and Viral Strain Collection Center for storage within 90 days, and promptly transfer the novel coronavirus strain to the storage institution for preservation after completing the relevant experimental activities.¹⁴²⁷

In its concluding sentence, laboratory leaks and laboratory acquired infections among researchers were specifically identified as threats that this circular was meant to address:

All provincial health administrative departments should earnestly strengthen organizational leadership, upgrade their laboratory biosafety oversight capabilities, carry out laboratory biosafety supervision and regulation in accordance with the principles of localization and classification, strengthen the supervision and inspection of experimental activities with the novel coronavirus, and guide relevant institutions within their jurisdictions to strengthen biosafety management, carry out experimental activities in strict accordance with the “Regulations on Biosafety Management of Pathogenic Microorganism Laboratories” and related technical standards, prevent laboratory leaks or infections of personnel, and ensure that there is no danger of anything going wrong with laboratory biosafety.¹⁴²⁸

JULY-AUGUST 2020: WHO SENDS ADVANCE TEAM TO CHINA TO LAY GROUNDWORK FOR PROBE

From July 10 to August 4, the WHO dispatched a two-member advance team to China to lay the groundwork for the joint China-WHO study of the origin of SARS-CoV-2 that

would eventually commence in earnest in early 2021.¹⁴²⁹ The two unidentified WHO experts, specialists in animal health and epidemiology respectively, were tasked with working with Chinese scientists to determine the scope and timing of the investigation, according to WHO Spokeswoman Margaret Harris. "We know it's very, very similar to the virus in the bat, but did it go through an intermediate species? This is a question we all need answered," Harris told a news briefing.¹⁴³⁰

WHO Director-General Tedros Adhanom Ghebreyesus later told the press: "Two WHO experts are currently en route to China to meet with fellow scientists and learn about the progress made in understanding the animal reservoir for COVID-19 and how the disease jumped between animals and humans.... This will help lay the groundwork for the WHO-led international mission into the origins."¹⁴³¹ Both Harris's and Tedros's comments presupposed zoonosis was the origin, suggesting that the WHO was not seriously considering the possibility of a lab-acquired infection at that point in time despite the WIV having earned a reputation, at least among experts in the field, as one of the world's most active centers of research on bat-borne coronaviruses since 2004. After the advance team departed China, Tedros said the "terms of reference" for the origin study had been drawn up by the WHO and China without specifying what those terms were.¹⁴³² It would later be revealed that those terms of reference did not include even a single mention of a potential laboratory accident, much less a requirement to allow laboratory inspections, and gave Beijing veto power over who would join the WHO's team.¹⁴³³

SEPTEMBER 2020: **BILLIONAIRE JAILED** FOR 18 YEARS FOR CRITICIZING XI'S RESPONSE TO OUTBREAK

On September 22, the Beijing Municipal No. 2 Intermediate People's Court sentenced outspoken real estate tycoon Ren Zhiqiang to 18 years in prison for "corruption, bribery and embezzlement of public funds."¹⁴³⁴ It was widely seen as a harsh punishment that was meant to make an example out of Ren and deter other CCP elites from speaking out against Xi and his policies.¹⁴³⁵ Readers will recall that Ren wrote an essay online in March that mocked Xi Jinping's performance at the February 23 national teleconference that he held with 170,000 cadres and military personnel, and described Xi as a "clown stripped naked who still wants to be the emperor." Ren's fate was forecast when the CCP announced on July 23 that it had expelled Ren from the party for "serious disciplinary violations," including having failed to keep in line with the Central

Committee on major issues of principle and having published articles that “defamed the party.”¹⁴³⁶

NOVEMBER 2020: WIV PATENTS DISINFECTANT TO STOP CORROSION OF LAB WALLS AND EQUIPMENT

On November 13, seven researchers at the WIV, including Yuan Zhiming, the director of the Wuhan National Biosafety Laboratory, filed a patent for a disinfectant to be used in sanitizing various surfaces in biocontainment laboratories.¹⁴³⁷ The researchers specifically noted that their modified disinfectant was both effective against SARS-CoV-2 and not corrosive to stainless steel.¹⁴³⁸ It is worth quoting the exact text of the patent at length to understand the motive behind the WIV’s work that produced a new disinfectant:

Notable differences exist between the construction of high-level biocontainment laboratories and that of other laboratories. They not only must have various biosafety protection facilities and equipment to prevent the escape of pathogenic microorganisms, but a disinfectant must also be used to exterminate highly pathogenic microorganisms. Owing to the fact that the protective facilities and equipment, including the protective barrier, airtight doors, chemical shower, double-door autoclave, the treatment system for wastewater containing live viruses, high-efficiency air filters, and laboratory air circulation system, and so on, are largely made of metal materials such as stainless steel, and furthermore are welded together, and when using the disinfectant it is directly sprayed onto the surface of the equipment, it is therefore the case that when choosing a disinfectant, high-level biosafety labs should not only ensure that it is effective at disinfecting, but it also needs to have no or little corrosive effect on metal components.¹⁴³⁹

However, among the disinfectants currently available, those that have a low corrosive effect on metals have poor effectiveness against highly pathogenic microorganisms, and because they are incapable of completely eliminating viral agents, they therefore cannot be used in high level biocontainment labs. Disinfectants that are effective at eliminating highly pathogenic microorganisms, on the other hand, are corrosive to metal to varying degrees, and prolonged use will cause the metal components to corrode, thereby reducing the protective function of the aforementioned facilities and equipment. This will not only lead

to economic losses by shortening the useful life [of the facilities and equipment], but it can even lead to the escape of highly pathogenic microorganisms into the environment outside of the laboratory, causing the loss of life and property and severe social problems. For this reason, the research and development of a disinfectant that is effective against highly pathogenic microorganisms, but without or with little corrosive effect to metal, such as stainless steel, is absolutely essential.¹⁴⁴⁰

Lest the reader wonder if that remark about the escape of pathogens was an isolated reference, the authors repeatedly described the purpose of the modified disinfectant as preventing pathogen escape, including in the summary of the patent. “By adding nano magnesium to the disinfectant solution, it noticeably reduces its corrosive effect on metal, especially stainless steel, thereby preventing the rise of biosafety accidents caused by highly pathogenic microorganisms that escape due to the corrosion of various metal components in the protective facilities and equipment in a high-level biosafety laboratory.”¹⁴⁴¹

Readers will recall that the CCP branch at the WIV’s Zhengdian Park campus, where the BSL-4 laboratory is housed, suggested in a report in November 2019 that WIV staff had resorted to technical workarounds and modifications to deal with the “stranglehold” problem and the “three nos,” as well as to satisfy Beijing’s demands for indigenous innovation.¹⁴⁴² One example of such modifications was particularly pertinent to this patent: “[Regarding] the protective structure for the core zone of the laboratory, the research team, following repeated testing, used an advanced laser welding method, which had a better airtight effect and was longer lasting, to replace the traditional glue sealant method. The P4 team possesses the intellectual property patent for this technology. The mathematical model of [our] independent design with automated controls produced a more stable differential pressure control effect.”¹⁴⁴³

The important point to absorb here is that what allowed the WIV to employ a laser welding method to seal the interior walls of these new laboratories was the fact that the walls had been constructed entirely of stainless steel. This was not the conventional choice for construction material, and it was a deliberate departure from the blueprint of the BSL-4 facility in Lyon that France had shared with China to serve as the model for the design and construction of the BSL-4 laboratory in Wuhan.¹⁴⁴⁴ The implication of

this patent is clear: WIV researchers discovered that the disinfectant they had been using to clean the surfaces of their stainless steel facilities and equipment was corrosive. That corrosion created porous holes, likely imperceptible to the naked eye, but big enough for a pathogenic microorganism like a coronavirus to slip through.

NOVEMBER 2020: WIV ADMITS TO KEY FACTS ABOUT RATG13 IN ADDENDUM TO NATURE ARTICLE

On November 17, Nature published an addendum to Shi Zhengli's paper that it had first published on February 3,¹⁴⁴⁵ which was discussed earlier in this chronology (see "January 2020: WIV Paper Omits Relevant Facts About SARS-CoV-2 Relative 'RaTG13'"). More than nine months after initial publication, the addendum acknowledged many of the relevant facts that had been mysteriously omitted from the original paper about SARS-CoV-2's closest relative, but later uncovered by scientists and Internet sleuths: the renaming of BtCoV/4991 to RaTG13, the WIV's sequencing of its full genome in 2018 (not in 2020), and its origin from the same mine in Yunnan Province where several men fell ill with a severe respiratory condition in 2013.¹⁴⁴⁶ Readers will recall that Peter Daszak had dismissed those who uncovered these facts as the "conspiracy folks."¹⁴⁴⁷

Two new pieces of important information emerged from the addendum. First, the WIV had not only tested the samples from the Mojiang mine patients for viruses at the time the samples were received, but they retested the samples after the pandemic began. This means that the samples had been stored at the WIV all along, but were never shared with research groups outside of China for independent verification.¹⁴⁴⁸ Second, the addendum revealed that the WIV had collected at least nine betacoronaviruses from the mine (including RaTG13), which it had never published or otherwise shared information about with the international community.¹⁴⁴⁹ Shi wrote in the addendum: "Between 2012 and 2015, our group sampled bats once or twice a year in this cave [sic] and collected a total of 1,322 samples. From these samples, we detected 293 highly diverse coronaviruses, of which 284 were designated alphacoronaviruses and [nine] were designated betacoronaviruses on the basis of partial RdRp sequences. All of the nine betacoronaviruses are SARSr-CoVs."¹⁴⁵⁰ By now, readers do not need reminding that SARS-CoV-2 is a betacoronavirus.

While the addendum cleared the air in some respects, it added to the fog of confusion in others. In one important clarification regarding the Mojiang mine illnesses in Yunnan,

the addendum acknowledged that “we suspected that the patients had been infected by an unknown virus.”¹⁴⁵¹ The addendum went on, however, to make claims about the Mojiang mine patients that were at odds with those found in two theses written in Chinese by WIV researchers in 2013 and 2016. The addendum claimed: “We tested the samples using PCR methods developed in our laboratory targeting the RNA-dependent RNA polymerases (RdRp) of Ebola virus, Nipah virus and bat SARSr-CoV Rp3, and all of the samples were negative for the presence of these viruses.”¹⁴⁵² It also claimed that the WIV had tested for antibodies against the same three viruses with negative results. The 2013 thesis, however, indicated that the WIV had detected serum immunoglobulin-M (IgM) antibodies against viruses in the miners. The 2016 thesis also reported that the four hospitalized patients who were still living at the time of the sampling carried IgG antibodies against SARS virus.¹⁴⁵³ A positive IgM test result indicates a recent exposure and likely infection.¹⁴⁵⁴

The WIV’s story would change yet again when Beijing finally allowed the WHO to visit Wuhan in early 2021; it would evolve in a direction that sought to further delink the viruses found in the mine in 2013 to the respiratory illnesses witnessed at that time. The WIV told the WHO team that the severe illness observed in the Mojiang mine patients was more likely explained by “fungal infections acquired when removing a thick layer of guano” than infection with a SARS-like coronavirus.¹⁴⁵⁵

NOVEMBER 2020: JI CHANGZHENG RETURNS TO THE WIV A YEAR LATER

On November 25 to 28, Ji Changzheng, the director of technology safety and security in the General Office of the CAS, returned to the WIV to conduct another biosafety training.¹⁴⁵⁶ Like the training that Ji conducted on November 20-22, 2019,¹⁴⁵⁷ this training was also relatively large in scale, boasting approximately 270 researchers in attendance.¹⁴⁵⁸ Unlike 2019, the researchers who participated in 2020 were drawn from labs around the country, not merely from the WIV and neighboring labs. The 2020 participants consisted of biosafety managers, laboratory technicians, management personnel, and graduate students. Other officials from Beijing, including from the NPC, joined Ji for the training.¹⁴⁵⁹

There was no report of any activity held by Ji in November 2020 that was comparable to the meeting he held with WIV and CAS management on November 19, 2019,¹⁴⁶⁰ before the larger training commenced on November 20, 2019. The report of the training in

2020 made no mention of senior CCP leaders such as Xi Jinping, did not invoke their “important oral remarks and important written instructions,” and said nothing about a “grave and complex situation.” This report was much more mundane and closely resembled the other reports of Ji’s routine trainings held around the country between 2017 and 2022.

THE CHRONOLOGY: 2021

JANUARY 2021: WUHAN REVISES EMERGENCY RESPONSE PLANS FOR “SUDDEN INCIDENTS”

On January 7, the Wuhan Municipal People’s Government issued a revised version of the “Wuhan Municipality Overall Emergency Response Contingency Plans for Sudden Incidents.” The original directive was enacted in March 2013.¹⁴⁶¹ “Sudden incidents” in the parlance of the CCP refers to a broad category of events that develop suddenly and which the CCP perceives as posing a potential threat to the stability of the political system. Everything from natural disasters to various kinds of accidents and mishaps to mass protests is grouped under the category of “sudden incidents.” The official response to “sudden incidents” instinctually focuses first and foremost on “stability maintenance” rather than addressing the underlying issue.¹⁴⁶²

One of the revisions to these contingency plans was of particular relevance to this study: sudden incidents related to pathogenic microorganisms were among the new scenarios added to update these contingency plans. In Section 1.3 under the heading “Classifying and Ranking Sudden Incidents,” a new category on “incidents [involving] bacterial and viral strains of pathogenic microorganisms” was added under an entirely new subsection on “public health incidents.”¹⁴⁶³ Public health incidents were described as follows: “the outbreak of infectious disease, safety incidents [involving] food and medicines, incidents [involving] mass poisonings and infections, incidents [involving] bacterial and viral strains of pathogenic microorganisms, incidents [involving] animal epidemics, incidents [involving] a mass outbreak of epidemic disease of unknown origin, and other incidents that have a serious impact on the lives, health, and safety of the public.”¹⁴⁶⁴

A chart classifying the different kinds of sudden incidents and designating the municipal government departments responsible for leading the response to them tasked the Wuhan

Municipal Health Commission with taking charge of the new category of “Biosafety Incidents [Involving] State Key Biological Laboratories.”¹⁴⁶⁵ The original 2013 version of the contingency plans was also examined and no references were found that exactly or roughly matched the key terms “biological laboratories,” “biosafety incidents,” “incidents [involving] bacterial and viral strains of pathogenic microorganisms,” and “incidents [involving] a mass outbreak of epidemic disease of unknown origin” that appeared in the 2021 revised edition.¹⁴⁶⁶

JANUARY-FEBRUARY 2021: WHO’S LONG-DELAYED STUDY TOUR HITS A GREAT WALL IN WUHAN

On January 14, more than a year after PRC authorities had first acknowledged the outbreak of SARS-CoV-2, a team of 13 scientists and experts with the WHO arrived in Wuhan to conduct a joint study with Chinese counterparts of the origin of SARS-CoV-2. The visit would last until February 9, though the WHO team spent their first two weeks on the ground in quarantine.¹⁴⁶⁷ The team was supposed to consist of 15 individuals in total, but PRC officials stopped two of them from departing from Singapore for China because they tested positive for COVID-19 antibodies, even though multiple PCR tests showed they were not infected with the virus.¹⁴⁶⁸ During the two weeks after quarantine beginning on January 28, the WHO team visited the shuttered Huanan Seafood Market, a few local hospitals, a frozen food storage facility, the Wuhan Municipal CDCP, the WIV, and a museum celebrating the authorities’ claimed victory over the virus.¹⁴⁶⁹

PRC authorities had blocked the WHO visit for months, then delayed it further, and ultimately exercised veto power over the foreign scientists selected to join the team. Beijing blocked three experts recommended by the U.S. government in favor of Peter Daszak, a zoologist based in New York City who had categorically dismissed the possibility of a laboratory origin and whose sub-contracting of coronavirus research to the WIV posed a conflict of interest.¹⁴⁷⁰ The Chinese scientists involved in the study had agreed in July 2020 to a plan that would have them gather and analyze critical data – such as early genomic sequences of the virus, hospital inpatient records, test samples of sewage and blood donations, and interviews with early victims – well in advance of the WHO team’s arrival in order to discuss them during the visit.¹⁴⁷¹

In August 2020 after the plan was established, the WHO shared its hope for access to new data that would allow a retrospective reconstruction of the early days of the outbreak. Dr. Michael Ryan, director of the WHO Health Emergencies Programme, lamented “gaps in the epidemiological landscape” and forecasted what needed to be done: “The real trick is to go to the human clusters that occurred first and then to work your way back systematically looking for that first signal at which the animal-human species barrier was crossed. Once you understand where that the barrier was breached, then you move into the studies in a more systematic way on the animal side.”¹⁴⁷²

The WHO team soon discovered, however, that some of the tasks the Chinese scientists agreed to undertake had not been completed, including detailed studies of blood samples from before December 2019 and the compilation of a complete list of animals sold at the Huanan Seafood Market. More importantly, PRC authorities were only willing to share their analysis of the data and repeatedly denied access to the raw data for independent WHO verification.¹⁴⁷³ One investigative report described “a heated exchange” that ensued when the WHO pressed their Chinese interlocutors on the key question of how widely the virus had spread around Wuhan before the first official confirmed case in early December.¹⁴⁷⁴ The Chinese team claimed to have examined 76,000 medical records and identified only 92 hospitalized patients from October, November, and early December 2019 whose symptoms were consistent with COVID-19. They further insisted that not one of the 92 had tested positive for antibodies. The WHO team knew that the number was too small because COVID-19’s symptoms are similar enough to other common diseases that “in a province of nearly 60 million people, vastly more cases should have been tested.”¹⁴⁷⁵

Some WHO team members quizzed their counterparts about the criteria used to select the 92 hospital cases, and expressed disbelief that PRC authorities had waited until only a few weeks before the team’s arrival to test for antibodies – knowing full well that antibodies fade over time, potentially to undetectable levels nearly a year after an infection. “The team pressed for immediate access to the raw, anonymized data on the 76,000 patients, which they thought could be filtered differently to identify something closer to 1,000 potential earlier Covid-19 infections,” according to the Wall Street Journal.¹⁴⁷⁶ The PRC side refused to cooperate and instead advised the WHO to study whether the pandemic originated outside of China.¹⁴⁷⁷

FEBRUARY 2021: XI LAUNCHES “EDUCATION AND RECTIFICATION” DRIVE AGAINST SECURITY FORCES

On February 27, the CCP Central Political and Legal Commission convened in Beijing to plan for and mobilize an internal campaign intended to “educate and rectify” the various security forces and legal and judicial offices under its jurisdiction nationwide.¹⁴⁷⁸ Commission Party Secretary Guo Shengkun, who was also a Politburo member and the head of the Leading Small Group for Nationwide Education and Rectification, delivered the main address at the meeting.¹⁴⁷⁹ The Central Political and Legal Commission is the CCP Central Committee’s organ for controlling the Ministry of Public Security, its domestic security apparatus, and the Ministry of State Security, its main foreign and domestic intelligence agency, as well as the Ministry of Justice and the court system.¹⁴⁸⁰

The themes emphasized at the meeting – the requirement to follow Xi Jinping’s ideas and edicts, the need to strictly regulate the security forces and strengthen their loyalty to the CCP as a whole and to Xi in particular, and the urgency to purge the forces of bad actors – betrayed Xi’s unease with his security forces.¹⁴⁸¹ While Sun Lijun’s name was not invoked explicitly in the public readout of the meeting, his shadow loomed large, and as made evident by orders such as “give prominence to the task of firmly building political loyalty, eliminate the black sheep that harm the herd, and bring stubborn maladies under control.”¹⁴⁸² Such evocative language was meant to convey a certain fear-inducing forcefulness.

Guo continued with this tactic:

Launching [the campaign] to educate and rectify the political-legal forces is a necessary requirement to uphold [the edict] to strictly manage the party and control the police and push forward with the self-revolution of the political-legal forces. [You] must develop a thoroughgoing revolutionary spirit. Confronting the particularity of law enforcement and judicial operations, mindful of the deep-seated problems exposed by the campaign to sweep away black and eliminate evil, [you] must adhere to [the approach of] full chain force, whole system rectification, by turning the blade inward, scraping the poison off the bone, eliminating the black sheep who harm the herd, and thoroughly rectifying the stubborn maladies.¹⁴⁸³

Readers will recall that the violent imagery of “turning the blade inward and scraping the poison off the bone” was taken from major speeches that Xi Jinping delivered in January 2019.¹⁴⁸⁴ The seriousness of the “education and rectification” campaign discussed by Guo can be assessed by its sweeping scope and swift implementation. Between February 2021 and the end of July 2021, 178,431 cadres working for the political-legal forces were subjected to punishment in connection with the campaign, including 19,847 police officers who voluntarily surrendered, 49,163 individuals whose cases were filed for formal review and investigation, 2,875 individuals who were detained, and 1,562 individuals whose cases were transferred to the judicial system for criminal prosecution.¹⁴⁸⁵ As many as 1,258 department heads were swept up in the campaign, 413 of whom committed “serious violations of discipline and law.”¹⁴⁸⁶

MAY 2021: HUBEI PROVINCE ISSUES DIRECTIVE AIMED AT LABORATORY WASTE MANAGEMENT

On May 27, five departments of the Hubei Provincial People’s Government jointly issued a directive to subordinate governments throughout the province, including its capital of Wuhan, on the issue of managing hazardous waste from laboratories.¹⁴⁸⁷ While the scope of the directive was quite comprehensive, it showed a clear concern about the possibility of pathogen escape as a result of inadequate biowaste storage procedures: “Laboratories that produce three or more tons [of hazardous waste] should build a standardized storage facility that satisfies the requirements to prevent dispersion, loss, and seepage [of hazardous waste] and implement professional management.”¹⁴⁸⁸ It also explicitly sought to address ways that waste disposal could result in laboratory acquired infections: “Relating to infectious waste at laboratories working with pathogenic microorganisms, you should follow the standards, regulations, and requirements, such as the General Use Requirements for Laboratory Biosafety (GB19489), to strengthen the disinfectant treatment and safe storage of infectious waste.”¹⁴⁸⁹

It appears that the WIV took this directive seriously. As we will discuss below, a little over four months after this directive was issued, WIV researchers would file a patent for a temporary waste storage unit to prevent the escape of viruses during the depositing and collecting of waste.¹⁴⁹⁰

JUNE 2021: WHO-CHINA STUDY **DISCREDITED** BY NEW DOCUMENTATION OF ANIMALS AT MARKETS

On June 7, an international team of five researchers from China, Canada, and the United Kingdom published a paper on animal sales that had been documented at Wuhan wet markets prior to the pandemic.¹⁴⁹¹ The researchers wrote:

Here we present a unique and original dataset recording wild animal sales across Wuhan City's animal markets between May 2017 and November 2019.... We note that no pangolins (or bats) were traded, supporting reformed opinion that pangolins were not likely the spillover host at the source of the current coronavirus (COVID-19) pandemic. While we caution against the misattribution of COVID-19's origins, the wild animals on sale in Wuhan suffered poor welfare and hygiene conditions and we detail a range of other zoonotic infections they can potentially vector.¹⁴⁹²

Xiao Xiao, the lead author of the study, who holds dual appointments at the Key Laboratory of Southwest China Wildlife Resources Conservation (Ministry of Education) at China West Normal University and at the Lab Animal Research Center at Hubei University of Chinese Medicine in Wuhan, surveyed several wet markets in Wuhan for over two years, and based on the data he collected, estimated that 47,381 individual animals representing 38 species, including 31 protected species, were likely sold between May 2017 and November 2019. Photographic evidence of various species that Xiao had found in the Wuhan markets was provided in the study.¹⁴⁹³ The Joint WHO-China study, by contrast, claimed the following: "Market authorities have confirmed that all reported live and frozen animals sold in the Huanan market were from farms that were legally licensed for breeding and quarantine, and that no illegal trade in wildlife has been found.... [N]o verified reports of live mammals being sold around 2019 were found."¹⁴⁹⁴

JULY 2021: WHO **ACKNOWLEDGES** IT WAS "PREMATURE" TO RULE OUT LAB LEAK ORIGIN

On July 15, Tedros Adhanom Ghebreyesus, the director-general of the WHO, acknowledged that Beijing had denied access to the raw epidemiological data that the WHO team had requested during its visit in February, citing this and other reasons that the WHO had been ill-advised to rule out the possibility that the pandemic began as a result of a laboratory acquired infection. Tedros called for greater transparency from

Beijing and spoke to journalists of a "premature push" to rule out the theory that the virus might have escaped from a Chinese government-run lab in Wuhan, which led to the joint WHO-China study to conclude in March that a laboratory leak was "extremely unlikely."¹⁴⁹⁵ "I was a lab technician myself, I'm an immunologist, and I have worked in the lab, and lab accidents happen," Tedros said, "It's common."¹⁴⁹⁶

Tedros was not clear who exactly was behind this "premature push," but one can imagine it was Beijing and/or one of its long-time international collaborators in the scientific community, such as Peter Daszak, who was chosen to serve on the WHO team at Beijing's insistence.¹⁴⁹⁷ Tedros said that "checking what happened, especially in our labs, is important" to nailing down if the pandemic had any laboratory links. "We need information, direct information, on what the situation of this lab was before and at the start of the pandemic," the WHO chief said, adding that China's cooperation was critical: "If we get full information, we can exclude (the lab connection)."¹⁴⁹⁸

SEPTEMBER 2021: "CONSPIRATORIAL CLIQUE" UNCOVERED IN JIANGSU

On September 14, a Chinese website called NetEase published a story citing an internal PRC government document that described a "conspiratorial clique" formed by several senior public security officers, mostly from Jiangsu Province. It also disclosed that the group was "planning something bad" when unnamed party leaders, likely Xi Jinping, were due to take part in commemorative activities related to World War II in Nanjing, the capital of Jiangsu. Unspecified security officials stepped in to "prevent the evil activity."¹⁴⁹⁹

The alleged orchestrator of the plot was Luo Wenjin, the head of the General Criminal Investigation Brigade of the Jiangsu Provincial Public Security Department, who was placed under investigation by the Jiangsu Provincial Discipline Inspection Commission in March 2021.¹⁵⁰⁰ Luo's co-conspirators included Deng Huilin, a former Deputy Mayor and head of the Public Security Department of Chongqing Municipality, who also once served as director of the General Office of the Central Political Legal Commission; Wang Like, the former secretary of the Jiangsu Provincial Political-Legal Committee and head of the Jiangsu Provincial Public Security Department; and Yan Ming, the executive vice president of the Jiangsu Provincial People's Procuratorate. Gong Dao'an, the deputy mayor and public security chief of nearby Shanghai Municipality, was also reportedly a participant in the plot.¹⁵⁰¹ Luo and Deng, both of whom hailed from Wuhan, were

longtime associates and the two main conspirators. The NetEase article accused the pair of having regularly “made ungrounded criticisms of fundamental policies of the CCP Central Committee and cast aspersions on the country’s main leaders.”¹⁵⁰²

The late billionaire entrepreneur Lai Xiaomin, the former chairman of the Huarong Asset Management Company, who was sentenced to death on charges of bribery and embezzlement in January 2021, was also alleged to have been in cahoots with Luo.¹⁵⁰³ In September 2021, Gong and Deng, both of whom were connected to sacked Vice Minister of Public Security Sun Lijun, were convicted of corruption, with the former receiving a suspended death sentence and the latter being sentenced to 15 years in prison.¹⁵⁰⁴

SEPTEMBER 2021: XI JINPING **MAKES** THE POLITBURO STUDY BIOSAFETY AND BIOSECURITY

On September 29, the Politburo of the CCP Central Committee, comprising the 25 highest ranking members of the CCP, gathered for their 33rd collective study session. On this occasion, the subject of study was “strengthening the building of biosafety and biosecurity in our country.”¹⁵⁰⁵ The study session was presided over by Xi Jinping, who called on the CCP’s top leaders to “scrutinize and tightly grasp the focus areas of biosafety and biosecurity risk and strengthen bottom line thinking and risk awareness.”¹⁵⁰⁶ The first of these focus areas was a biosecurity concern, “monitoring and managing the security of biological resources,” particularly genetic data,¹⁵⁰⁷ a concern that the PLA had harbored for years,¹⁵⁰⁸ and one that central authorities had sought to address with regulatory revisions in 2019.¹⁵⁰⁹

Xi’s second focus area was also one of biosecurity, specifically biosecurity at China’s ports of entry, a concern which Xi also had been preoccupied with as early as March 2019.¹⁵¹⁰ “We must strengthen entry quarantine, strengthen analysis of the latent risks and the punishment of conduct that violates laws and regulations, and resolutely guard the nation’s gates and checkpoints,” Xi noted, adding the following cryptic instruction, “For those [threats] that have already entered and caused serious harm, we must ascertain the truth of the matter.”¹⁵¹¹

For his third focus area of concern, Xi Jinping shifted from biosecurity to biosafety, specifically the risks posed by biocontainment laboratories: “We must strengthen the biosafety management of domestic laboratories working with pathogenic

microorganisms by strictly enforcing the relevant standards and regulations while also strictly managing experimental samples, laboratory animal subjects, and the waste from experimental activities.”¹⁵¹² Readers will hear recognizable themes in Xi’s remarks, recalling that in January 2020 the NHC prohibited researchers and clinicians from sharing samples of SARS-CoV-2 and ordered them to destroy those in their possession,¹⁵¹³ while seven central government ministries jointly issued a directive in February 2020 ordering the provinces to strengthen control over BSL-3 and BSL-4 laboratories – singling out the control of samples and safe storage as chief concerns.¹⁵¹⁴ In May 2021, the province in charge of Wuhan issued new regulations on managing biowaste,¹⁵¹⁵ and less than a month after Xi’s remarks here to the Politburo, the WIV would file a patent application for a technology aimed at addressing the same problem.¹⁵¹⁶

Echoing his speeches from 2020, Xi Jinping continued to stress the need for an early warning system specifically for biosafety/biosecurity incidents: “We must organize a firmly and tightly secured network for risk monitoring and early warning, comprehensively build a risk monitoring and early warning system, focus on strengthening the building of risk monitoring stations at the grassroots level, and improve our ability to detect [problems] at the back end. We must quickly become aware of and quickly distinguish sudden outbreaks of infectious diseases...[,] reaching the point of early detection, early warning, and early response.”¹⁵¹⁷

Xi Jinping wanted the Politburo to appreciate that biosecurity and biosafety were not technical matters or niche issues reserved for specialists, but rather were urgent matters for all cadres to consider:

Xi Jinping, General Secretary of the Central Committee of the Chinese Communist Party, while presiding over the study [session], emphasized that biosafety and biosecurity are matters related to the health and lives of the people, matters related to the lasting political stability of the state, matters related to sustaining the development of the Chinese nation. [Biosafety and biosecurity] are component parts of the holistic view of national security and also a powerful force that can influence, and even reshape, the world order. [We] must deeply comprehend the importance and urgency of strengthening biosafety and biosecurity under these new conditions.¹⁵¹⁸

Xi Jinping admitted that problems persist with biosafety and biosecurity, and that these problems have the potential to directly affect the security of the party-state:

Xi Jinping stressed that at present, traditional biosafety and biosecurity problems and a new type of biosafety and biosecurity risks are layered on top of one another and mutually reinforcing. External biosecurity threats and internal biosafety risks are intertwined, existing side-by-side. Biosafety and biosecurity risks present numerous new characteristics. Shortcomings and weak spots exist in our country's system for preventing, controlling, and managing biosafety and biosecurity risks. We must scientifically analyze the biosafety and biosecurity conditions in our country, ascertain the risks and challenges we face, and make clear the ideas and measures [needed] to strengthen the building of biosafety and biosecurity.¹⁵¹⁹

Xi's understated references to "shortcomings" and "weak spots" in China's biosafety practices are, by now, a familiar refrain to readers, not only because they populated Xi's speeches during the early days of the pandemic,¹⁵²⁰ but more importantly, because they had first appeared in reports issued by the CAS and WIV in 2018 and leading up to the outbreak in 2019.¹⁵²¹

Xi concluded with a message that biosafety and biosecurity were long-term tasks requiring the sustained focus of cadres at all levels:

Strengthening the building of biosafety and biosecurity is a long-term and arduous task requiring continuous exertion and steady advancement. Party committees (party organizations) and governments at all levels must earnestly unify their thoughts and actions with the decisions and deployments made by the Party Central Committee, and [you must] fully implement your responsibilities for biosecurity and biosafety work as you are duty-bound to defend your country and must discharge these responsibilities [to defend the country accordingly].¹⁵²²

Before closing, Xi included a throwaway line about searching for the origin of SARS-CoV-2, a search which apparently warrants an occasional mention by PRC officials, but for which no details have ever emerged beyond the highly problematic joint WHO-China study. "Follow the rules of science to push ahead with the work to trace the origin of the novel coronavirus," Xi said.¹⁵²³

OCTOBER 2021: XI JINPING **SACKS** MINISTER OF JUSTICE AND FORMER SECURITY OFFICIAL

On October 2, Minister of Justice Fu Zhenghua, who had also previously served as Vice Minister of Public Security, was sacked for allegedly being in cahoots with Vice Minister for Public Security Sun Lijun, who was purged in April 2019 for disloyalty to Xi Jinping and leaking classified material related to the government's response to the coronavirus outbreak.¹⁵²⁴ The announcement that Fu had been placed under investigation by the CCP Central Commission for Discipline Inspection came just one day after the commission issued a stinging criticism of Sun, marking the conclusion of 17 months of investigation.¹⁵²⁵

In September 2022, Sun Lijun and Fu Zhenghua were both sentenced to death with a two-year reprieve, a sentence which may later be commuted to life in prison.¹⁵²⁶ That same month the former public security chiefs for the three provincial level jurisdictions of Shanghai, Chongqing, and Shanxi were also sentenced to prison on corruption charges and allegations of colluding with Sun Lijun against Xi Jinping.¹⁵²⁷ Unconfirmed reports suggest that one of Sun's acts of political disloyalty may have been wiretapping Xi's conversations.¹⁵²⁸ Another unofficial account of Sun's crimes claims that Sun shared notes of his observations in Wuhan of the party's handling of the outbreak to his Sydney-based wife, which were intercepted by Australian intelligence agencies.¹⁵²⁹ Whatever the case, the CCP has been unequivocal in its condemnation of Sun, calling on his former colleagues in the public security apparatus to "resolutely and thoroughly eliminate the poisonous influence of Sun Lijun."¹⁵³⁰

OCTOBER 2021: WHO FORMS **NEW** TEAM TO STUDY ORIGIN

On October 13, the WHO announced that it had set up a new panel of 26 scientists tasked with reinvigorating the WHO's stalled inquiry into the origin of the novel coronavirus that caused the pandemic. Experts in virology, epidemiology, and animal health were tapped to serve on the team, and unlike the original WHO team, at least one specialist in laboratory biosafety was included in the newly enlarged configuration.¹⁵³¹ "This is our best chance, and it may be our last chance, to understand the origins of this virus," Mike Ryan, executive director of the WHO's health emergencies program, told reporters, "We are at a very important moment." Ryan and other WHO officials stressed that time was running out to examine blood samples and other important

epidemiological indicators of exactly when, where, and how the pandemic started.¹⁵³² At the time of writing of this report, it appeared that the new WHO team had encountered the same roadblocks erected by the PRC authorities that had impeded the work of the original team, including denial of access to critical data on and clinical samples taken from early COVID-19 cases.

OCTOBER 2021: WIV PATENTS TEMPORARY STORAGE UNIT FOR HAZARDOUS SOLID WASTE

On October 15, three researchers from the WIV filed a patent application for a temporary storage unit for hazardous solid waste for use in high level biosafety laboratories.¹⁵³³ This storage unit was aimed at preventing the leak of viruses during the depositing and collecting of waste due to operator error.¹⁵³⁴ The patent application explained that temporary storage units used in high-level BSL labs were typically operated by a single person, whose mishandling of waste could create risks for pathogen escape. The three WIV researchers designed this new storage unit to require two people to rotate the unit in order to open the door of the storage bin. The reason given for this design was to prevent the mistake of a single individual leading to the escape of pathogens.¹⁵³⁵ A code is also required to open the door of the storage unit to prevent accidental opening. Moreover, the design added a feature to the wind tunnel that would spray a disinfectant solution onto the user's hand during the process of depositing and collecting of waste.¹⁵³⁶

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¹ Strictly speaking, one can distinguish clearly between biosafety (生物安全) and biosecurity (生物安保) in Chinese, but more often than not, 生物安全 is used interchangeably for both terms. A helpful discussion of the difference between the two terms in the English context can be found in the proceedings of a December 2014 workshop on gain-of-function research: “Biosafety provides policies and practices to prevent the unintentional or accidental release of specific biological agents and toxins, whereas biosecurity provides policies and practices to prevent the intentional or negligent release of biological materials or the acquisition of knowledge, tools, or techniques that could be used to cause harm. Thus, while providing a foundation upon which to build biosecurity capacity, biosafety measures, in and of themselves, cannot fully address biosecurity risks.” See, The National Research Council 2015, “Chapter 5: Potential Risks: Biosafety and Biosecurity,” in *Potential Risks and Benefits of Gain-of-Function Research: Summary of a Workshop* (Washington, DC: The National Academies Press, 2015), p. 59.

² For examples of the English translation, see “China Adopts Law to Safeguard Biosecurity,” *Xinhuanet*, 17 October 2020; “China’s Top Legislator Stresses Full Implementation of Biosecurity Law,” *Xinhuanet*, 01 April 2021; and “China’s Biosecurity Law Goes into Effect,” *Xinhuanet*, 16 April 2021. For the original Chinese text of the law, see the “Biosecurity Law of the People’s Republic of China” (中华人民共和国生物安全法), *The National People’s Congress of the People’s Republic of China* (Online), 17 October 2020.

³ Yuan Zhiming, et. Al, “Biosafety Level 4 Laboratory User Training Program, China,” *Emerging Infectious Diseases* (Volume 25, Number 5), the *U.S. Centers for Disease Control and Prevention* (Online), 26 March 2019.

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⁷ Scott Moore, “China’s Role in the Global Biotechnology Sector and Implications for U.S. Policy,” *The Brookings Institution*, April 2020, p. 2.

⁸ Tai Ming Cheung, “Keeping Up with the *Jundui*: Reforming the Chinese Defense Acquisition, Technology and Industrial System,” in *Chairman Xi Remakes the PLA: Assessing Chinese Military Reforms*, ed. Phillip C. Saunders, et al., (Washington, DC: National Defense University Press, 2019), p. 594.

⁹ The quoted phrase comes from the sentence “瞄准新一代信息技术、高端装备、新材料、生物医药等战略重点.” See, “The State Council Announcement Regarding the Made in China 2025 Circular” (国务院关于印发“中国制造 2025”的通知), PRC State Council Document No. 28 for 2015, posted online at *gov.cn*, the official website of the Central Government of People’s Republic of China, 19 May 2015.

¹⁰ *2021 Report to Congress of the U.S.-China Economic and Security Review Commission*, One Hundred Seventeenth Congress, First Session, November 2021, p. 174-175, 177.

¹¹ *Ibid*, p. 179.

¹² *Ibid*, p. 175.

¹³ Elsa B. Kania, “Minds at War: China’s Pursuit of Military Advantage through Cognitive Science and Biotechnology,” *PRISM Journal*, Vol. 8, No. 3, (National Defense University: January 2020), p. 91.

¹⁴ Jasper Becker, *Made in China: Wuhan, Covid, and the Quest for Biotech Supremacy*, (London: C. Hurst & Co. Ltd., 2021), p. 58.

¹⁵ Scott Moore, “China’s Role in the Global Biotechnology Sector and Implications for U.S. Policy,” *The Brookings Institution*, April 2020, pg. 1.

¹⁶ Ibid, pg. 2.

¹⁷ Emphasis added. The expert who was quoted is Tara J. O'Toole. See Claudia Adrien, "Chinese Biotechnology Dominates U.S. Senate Hearing on Biological Threats," *Homeland Preparedness News*, 21 November 2019.

¹⁸ The quoted text is "充分发挥武汉生物制品研究所, 中科院 P4 生物安全实验室, 国药集团武汉血液制品公司等核心机构的带动作用." See, "General Office of the Wuhan Municipal People's Government Circular on the Release of the Wuhan Municipal Greater Health Industry Development Plan (2019-2035)," [市人民政府办公厅关于印发武汉市大健康产业发展规划 (2019-2035 年) 的通知], *Wuhan Municipal People's Government*, 08 April 2019, p. 19.

¹⁹ The quoted text is "积极申报武汉综合性国家产业创新中心" and "积极谋划建设国家重大科技基础设施群." See, "Hubei Provincial Development and Reform Commission Opinion and Work Notice Concerning the Implementation of the Strategy to Accelerate the Rise of the Central Region and Promote High-Quality Development" (省发展改革委关于落实促进中部地区崛起战略推动高质量发展意见工作的通知), *Hubei Provincial People's Government*, 29 November 2019.

²⁰ Ibid. The quoted text is "提高关键领域自主创新能力."

²¹ The quoted text is "P4 实验室建设对中国公共卫生至关重要." See, Zheng Qianli (郑千里) and Li Li (李莉), "Jiangxia Leads a New Literature, Riding a Crane while Playing a Carefree Tune: An Account of the Chinese Academy of Sciences Wuhan Institute of Virology P4 Laboratory Construction and Research Team" (江夏演新文 乘鹤奏悠曲 — 记中科院武汉病毒研究所 P4 实验室建设和研究团队), *China Science Daily* (中国科学报), 08 January 2018.

²² Kevin Pollpeter and Kenneth W. Allen, eds, *The PLA as Organization v2.0*, Defense Technical Information Center, 14 June 2012, p. 204.

²³ Zhang Huan, "Infectious Disease Monitoring System in Sierra Leone Built with Aid of Chinese Medical Experts," *The People's Daily Online* (English Edition), 08 September 2017.

²⁴ Pollpeter and Allen, p. 204. For an example of PLA vaccine development, see Zhuang Yingna (庄颖娜), Chen Dong (陈冬), and Zhang Zhenwei (张振威), "Qin Chengfeng's Research Group Develops Vaccine for Zika Virus Makes New Progress in Treating Encephaloma" (秦成峰团队研发寨卡病毒疫苗治疗脑瘤获新进展), *People's Liberation Army Daily*, 02 January 2019.

²⁵ Eric Croddy, "Chinese Chemical and Biological Warfare Capabilities," in *China and Weapons of Mass Destruction: Implications for the United States*, U.S. National Intelligence Council, 05 November 1999.

²⁶ Ellen Nakashima and Aaron Schaffer, "Biden Administration Places Top Chinese Military Institute on Export Blacklist over its Use of Surveillance, 'Brain-Control' Technology," *The Washington Post*, 16 December 2021.

²⁷ Joel Wuthnow, "China's 'New' Academy of Military Science: A Revolution in Theoretical Affairs?," *China Brief*, Volume 19, Issue 2, Jamestown Foundation, 18 January 2019.

²⁸ Joel Wuthnow and Phillip C. Saunders, "Introduction: Chairman Xi Remakes the PLA," in *Chairman Xi Remakes the PLA: Assessing Chinese Military Reforms*, ed. Phillip C. Saunders, et al., (Washington, DC: National Defense University Press, 2019), p. 1-2.

²⁹ Joel Wuthnow, "China's 'New' Academy of Military Science: A Revolution in Theoretical Affairs?," *China Brief*, Volume 19, Issue 2, Jamestown Foundation, 18 January 2019.

³⁰ Elsa B. Kania, "Minds at War: China's Pursuit of Military Advantage through Cognitive Science and Biotechnology," *PRISM Journal*, Vol. 8, No. 3, National Defense University: January 2020, p. 84.

³¹ Joel Wuthnow, "China's 'New' Academy of Military Science: A Revolution in Theoretical Affairs?," *China Brief*, Volume 19, Issue 2, Jamestown Foundation, 18 January 2019.

³² The quoted text is "被喻为 '防化兵摇篮'." See, "2019 Military Schools' Student Recruitment Brochure Station No. 26: The Army's Institute of Chemical Defense," (2019 军校招生简章第二十六站: 陆军防化学院), *The People's Liberation Army Daily*, 26 June 2019. For the history of the ICD's founding, see "Brief Introduction to the PLA Institute of Chemical Defense," (解放军防化学院简介), *The People's Liberation Army Daily*, 05 May 2015.

³³ The first known instance occurred during the January 1955 campaign to take the Yijiangshan Islands from the CCP's rival, the Chinese Nationalist Party (KMT). See, Eric Croddy, "Chinese Chemical and Biological Warfare Capabilities," in *China and Weapons of Mass Destruction: Implications for the United States*, U.S. National Intelligence Council, 05 November 1999.

³⁴ David Shambaugh, *Modernizing China's Military: Progress, Problems, and Prospects*, (University of California Press: Los Angeles, 2002), p. 89.

³⁵ “2019 Military Schools’ Student Recruitment Brochure Station No. 26: The Army’s Institute of Chemical Defense,” (2019 军校招生简章第二十六站: 陆军防化学院), *The People’s Liberation Army Daily*, 26 June 2019.

³⁶ Yuan Zhiming, Et. al, “Considerations about Improving the Planning of High-Level Biosafety Laboratory System in China,” (关于加强我国高等级生物安全实验室体系规划的思考), *Bulletin of the Chinese Academy of Sciences* (中国科学院院刊), 2016, 31(10): 12.

³⁷ Note that Yuan was the lead author in one of the Chinese reports that date the lab’s creation to 1987, but when writing in English, the date changed to “early 1980s” for some unknown reason. Since this article was written in English and thus intended for international consumption, this inconsistency may be an attempt to predate the lab’s construction before the PRC acceded to the BWC in 1984. Yuan Zhiming, “Current Status and Future Challenges of High-Level Biosafety Laboratories in China,” *Journal of Biosafety and Biosecurity*, Volume 1, Issue 2, September 2019, p. 124.

³⁸ Ibid.

³⁹ “How to Distribute? Guangdong Province Plans to Build 25-30 P3 Laboratories” (如何布局? 广东规划建设 25-30 家 P3 实验室), *Antpedia*, 26 May 2020.

⁴⁰ William J. Broad and Judith Miller, “Soviet Defector Says China Had Accident at Germ Plant,” *The New York Times*, 05 April 1999; and Ken Alibek, *Biohazard*, (Random House: New York, 1999), p. 273; and Eric Croddy, “Chinese Chemical and Biological Warfare Capabilities,” in *China and Weapons of Mass Destruction: Implications for the United States*, U.S. National Intelligence Council, 05 November 1999.

⁴¹ Eric Croddy, “China’s Role in the Chemical and Biological Disarmament Regimes,” *The Nonproliferation Review* (Spring 2002), p. 26.

⁴² Ken Alibek, *Biohazard*, (Random House: New York, 1999), p. 273.

⁴³ Office of the Secretary of Defense, “2021 Annual Report to Congress: Military and Security Developments Involving the People’s Republic of China,” *U.S. Department of Defense*, 03 November 2021, p. 95.

⁴⁴ See Eric Croddy, “Chinese Chemical and Biological Warfare Capabilities,” in *China and Weapons of Mass Destruction: Implications for the United States*, U.S. National Intelligence Council, 05 November 1999.

⁴⁵ R. Jeffrey Smith, “China May Have Revived Germ Weapons Program, U.S. Officials Say,” *The Washington Post*, 24 February 1993.

⁴⁶ Dany Shoham, “China’s Biological Warfare Programme: An Integrative Study with Special Reference to Biological Weapons Capabilities,” *Journal of Defence Studies*, Vol. 9, No. 2 (April-June 2015), p. 137.

⁴⁷ Office of the Secretary of Defense, “2021 Annual Report to Congress: Military and Security Developments Involving the People’s Republic of China,” *U.S. Department of Defense*, 03 November 2021, p. 95. It is worth noting that the PRC did not sign the BWC until 1984. When the BWC was signed in 1972 by the United States, the United Kingdom, and the Soviet Union, the PRC delegation at the General Assembly attacked the convention as a “sham.” See, “Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on Their Destruction,” U.S. Department of State Archive, <https://2001-2009.state.gov/t/ac/trt/4718.htm>.

⁴⁸ Ibid.

⁴⁹ “Fact Sheet: Activity at the Wuhan Institute of Virology,” Office of the Spokesperson, *U.S. Department of State*, 15 January 2021.

⁵⁰ “Adherence to and Compliance with Arms Control, Nonproliferation, and Disarmament Agreements and Commitments,” *the U.S. Department of State*, April 2021, p. 46-47.

⁵¹ Guo Jiwei and Yang Xuesen, “Ultramicro, Nonlethal, and Reversible: Looking Ahead to Military Biotechnology,” *Military Review* (Army University Press: July-August 2005), p. 75-76.

⁵² Ibid, p. 76.

⁵³ Elsa B. Kania, “Minds at War: China’s Pursuit of Military Advantage through Cognitive Science and Biotechnology,” *PRISM Journal*, Vol. 8, No. 3 (National Defense University: January 2020), p. 91.

⁵⁴ UN Office for Disarmament Affairs, “New scientific and technological developments relevant to the Convention : background information document : addendum / submitted by the Implementation Support Unit,” Seventh Review Conference of the State Parties to the Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on Their Destruction, *United Nations Digital Library*, 23 November 2011, p. 1-3.

⁵⁵ Ibid, p. 4.

⁵⁶ Ibid, p. 4.

⁵⁷ Ibid, p. 3.

⁵⁸ The quoted text is “生物化战争将粉墨登场... 机械化之后是信息化, 信息化之后则是生物化... 科学技术首先最广泛运用于军事. 那么现在什么最发达, 什么发展得更迅猛呢? 那生物科学!” See, Mao Zhiwen (毛志文), “Expert: Biologized Warfare is On the Verge of Reaching a Critical Juncture” (专家: 生物化战争行将兵临城下), *The People’s Daily* reposted by the *People’s Liberation Army Daily*, 10 January 2014.

⁵⁹ Ibid. The quoted text is “科学家们长期的不懈探索求新, 使得基因芯片, 蛋白芯片等生物技术日臻成熟, 酶工程, 细胞工程等生物工程也层出不穷. 生物技术和生物工程的有机 ‘嫁接’, 在造福人类民生的同时, 也催生了一批又一批生物武器.”

⁶⁰ Ibid. The quoted text is “可预测的生物化战争行将兵临城下.”

⁶¹ See Bo Zhiyue, “Who Are China’s Princelings?,” *The Diplomat*, 24 November 2015. For an interesting analysis of recent reports of Liu’s influence among princelings leading to political troubles with Xi Jinping, see “Xi’s Political Considerations and the Risk of Cross-Strait Crisis in 2022,” *SinoInsider*, 06 January 2022.

⁶² Elsa B. Kania and Wilson Vorndick, “Weaponizing Biotech: How China’s Military is Preparing for a ‘New Domain of Warfare’,” *Defense One*, 14 August 2019.

⁶³ Elsa B. Kania, “Minds at War: China’s Pursuit of Military Advantage through Cognitive Science and Biotechnology,” *PRISM Journal*, Vol. 8, No. 3 (National Defense University: January 2020), p. 85, 91.

⁶⁴ Du’s book was published by White Mountain Press, the official publishing house for the PLA’s Shenyang Military Region that is managed by the Military Region Political Department.

⁶⁵ Du Chao (杜超), *China’s Future War* (中国未来战争), Shenyang: White Mountain Press (白山出版社), 2012, p.118-119.

⁶⁶ Elsa B. Kania and Wilson Vorndick, “Weaponizing Biotech: How China’s Military is Preparing for a ‘New Domain of Warfare’,” *Defense One*, 14 August 2019.

⁶⁷ “Zhang Shibo Biography,” *China Vitae*, accessed on 07 March 2022, https://www.chinavitae.com/biography/Zhang_Shibo/full

⁶⁸ Many thanks to retired U.S. Army Colonel and distinguished PLA scholar Dr. Larry Wortzel for providing this helpful analysis of Zhang’s and Du’s writings in conversations with Senator Rubio’s staff.

⁶⁹ Elsa B. Kania and Wilson Vorndick, “Weaponizing Biotech: How China’s Military is Preparing for a ‘New Domain of Warfare’,” *Defense One*, 14 August 2019.

⁷⁰ Zhang Qiang (张强), “Genetic Weapons: A Pandora’s Box Worth Watching Out For” (基因武器: 值得警惕的 ‘潘多拉’ 魔盒), *Science and Technology Daily*, 02 November 2017. This article was reprinted by the *People’s Liberation Army Daily* on 06 November 2017.

⁷¹ See, Wang Jun (王军), “Genetic Warfare will Reshuffle and Transform Human Warfare” (基因战争将以洗牌式变革人类战争), *People’s Liberation Army Daily*, 23 January 2014.

⁷² Shi Chunmin (石纯民), “Gene Editing: a Weapon to End the World?” (基因编辑, 世界末日武器?), *China National Defense News* (中国国防报), 29 February 2016. Some other outlets that carried this article used an alternative title of “American Media: U.S. Army is Developing Genetic Weapons, Collecting Genes of Asians and Chinese” (美媒: 美军研发基因武器 搜集亚洲华人等基因).

⁷³ Wei Qing (魏庆), “Beware of a Large-Scale Surprise Attack by New-Type of Biological Weapons” (警惕新型生物武器的大规模袭击), *National Defense Reference* (国防参考) reprinted in the *People’s Liberation Army Daily*, 09 March 2016.

⁷⁴ The quoted text is “针对未来生物信息战可能实施的战法, 途径和手段, 也要进行专门研究, 及早制定行动预案.” Zhang Qiang (张强), “Genetic Weapons: A Pandora’s Box Worth Watching Out For” (基因武器: 值得警惕的 ‘潘多拉’ 魔盒), *Science and Technology Daily*, 02 November 2017. This article was reprinted by the *People’s Liberation Army Daily* on 06 November 2017.

⁷⁵ Ibid. The quoted text is “一句话, 就是用 DNA 重组技术改变细菌或病毒, 使不致病的成为可致病的, 让可以用疫苗或药物预防和救治的疫病, 变得难于预防和治疗. 把这种生物战剂放入施放装置内, 就构成了基因武器.”

⁷⁶ Cao Shiyang (曹诗洋), “How Will Genetic Weapons Affect Future Warfare?” (基因武器如何影响未来战争), *The People’s Liberation Army Daily*, 10 November 2017.

⁷⁷ Ibid. The quoted text is “基因武器是指通过基因编辑技术修改致病微生物的基因编码, 而研制出的新一代生物武器, 能够从基因层面对敌发动攻击. 简单来说, 基因编辑技术就相当于一把基因 ‘剪刀’, 可以按照主观意愿将一种生物的基因片段 ‘剪接’ 到另一种生物上, 从而改变其生理特征. 基因武器正是通过这种方式修改基因获得新的致病微生物, 从而使对方的疫苗库失效.”

⁷⁸ Ibid. The quoted text is “由于基因武器是 ‘剪’ 出来的新病毒, 新细菌, 遗传密码只有设计者才知道, 对方很难及时破译并研制出新的疫苗与对抗. 即使更新了疫苗库, 仍有源源不断的新的基因武器 ‘整装待发’.”

⁷⁹ Ibid. The quoted text is “如果操作不当或运气不佳, 运输过程中一旦发生泄漏, 伤到自己人, 无异于 ‘搬起石头砸自己的脚’.”

⁸⁰ The quote was excerpted from the following text: “当前基因组编辑, 合成生物学, 新型神经学等现代生物技术发展十分迅速. 这些技术的发展也带来生物武器扩散, 生物恐怖袭击, 病原体跨物种感染, 跨地域传播等一系列重大安全问题.” See Guo Yanjiang (郭颜江), “The Militarization of Biotechnology,” (生物技术军事化), *Guancha Syndicate*, 21 February 2019.

⁸¹ The quoted text is “内部监管漏洞风险.” See Wang Xiaoli (王小理) and Zhou Dongsheng (周冬生), “Looking toward International Biosecurity Situation in 2035,” (面向 2035 年的国际生物安全形势), *The Study Times* (学习时报), 20 December 2019. Note that *The Study Times* is published by the Central Party School of the CCP Central Committee.

⁸² The quoted text is “原因很简单, 足够数量的人类遗传基因样本, 能够让一些国家研制出专门的 ‘基因武器,’ 尤其是 ‘人种基因武器,’ 或成为笼罩在世人头上新的阴影, 让人不得不防.” Tan Xueping (谭雪平) and Yang Yu (杨宇), “Genetic Warfare: A New Shadow Enveloping Humanity” (基因战争, 笼罩人类的新阴影), *The People’s Liberation Army Daily*, 08 November 2018.

⁸³ Ibid. The quoted text is “有研究表明, 人类 DNA 中 99.7%至 99.9%都是相同的, 而这些占比很少的不同点, 才是将各个种族区分开来的关键. 因此, 每一个民族与人种都有独特的基因特征, 从理论层面而言, 根据这个特征就可以研制出杀伤预定种族对象的基因武器...”

⁸⁴ These new regulations updated and replaced provisional measures that were first put into effect in 1998. “Premier Li Keqiang Signs State Council Order announcing ‘the People’s Republic of China Human Hereditary Resources Management Regulations’” (李克强签署国务院令公布《中华人民共和国人类遗传资源管理条例》), *Xinhua News Agency* reprinted in the *People’s Liberation Army Daily*, 10 June 2019.

⁸⁵ Ibid.

⁸⁶ UN Office for Disarmament Affairs, “New scientific and technological developments relevant to the Convention : background information document : addendum / submitted by the Implementation Support Unit,” Seventh Review Conference of the State Parties to the Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on Their Destruction, *United Nations Digital Library*, 23 November 2011, p. 2.

⁸⁷ Ibid, p. 2-3.

⁸⁸ Xu Dezhong (徐德忠) and Li Feng (李锋), eds., *The Unnatural Origin of SARS and New Species of Artificial Viruses as Genetic Weapons* (非典非自然起源和人制人新种病毒基因武器) (Beijing, China: Academy of Military Medical Sciences Press, August 2015).

⁸⁹ When Australian journalist Sharri Markson reported on this book in 2021, some media outlets criticized her coverage as sensationalistic. To be clear, Senator Rubio’s staff read the original Chinese text and did not rely on Markson’s reporting for the analysis that appears here. *The Guardian* in its criticism of Markson’s reporting cited James Palmer who dismissed the PLA work as having a “strong conspiratorial bent.” *The Guardian* claimed the book had supposedly been “discredited,” but by whom *the Guardian* did not say. To be sure, the book’s thesis about the origin of SARS-CoV-1 flies in the face of accepted scientific opinion. For the purposes of this study, however, what matters is *not* what most virologists might make of its thesis, but rather the book’s reception within the PLA. The book bears the imprimatur of the PLA AMMS and was written and edited by a board of PLA specialists. Those two facts do not mean that the book represents the PLA’s final view on the matter, but nor do they allow us to dismiss the book as the idiosyncratic musings of fringe figures. The book was not a sensationalist title written for easy consumption by a general audience hungry for a compelling military conspiracy. Rather it is a dense and technical work that was published by an official PLA press, not a commercial outlet looking to turn a profit. In this regard,

Palmer's dismissal of the book is ill-considered. See, Amanda Meade and Daniel Hurst, "News Corp Exclusive on Chinese 'Bioweapons' Based on Discredited 2015 Book of Conspiracy Theories," *The Guardian*, 13 May 2021.

⁹⁰ Xu Dezhong (徐德忠) and Li Feng (李锋), eds., *The Unnatural Origin of SARS and New Species of Artificial Viruses as Genetic Weapons* (非典非自然起源和人制人新种病毒基因武器) (Beijing, China: Academy of Military Medical Sciences Press, August 2015), pg. 40-42.

⁹¹ Frederick Chi-Ching Leung, et. al., "Evidence of the Recombinant Origin of a Bat Severe Acute Respiratory Syndrome (SARS)-Like Coronavirus and Its Implications on the Direct Ancestor of SARS Coronavirus," *Journal of Virology*, February 2008, 82(4): 1819-1826. Note that 4.08 years was actually the median estimate.

⁹² The quoted text is "SARS-CoV 这 4 年多之进化时间不可能发生在自然界, 唯可能出现在人工设置场所内, 应用人工技术..." Xu Dezhong (徐德忠) and Li Feng (李锋), eds., *The Unnatural Origin of SARS and New Species of Artificial Viruses as Genetic Weapons* (非典非自然起源和人制人新种病毒基因武器) (Beijing, China: Academy of Military Medical Sciences Press, August 2015,) pg. 41.

⁹³ Ibid, pg. 47-48. The quoted text is "1. 应用最新的基因改造技术, 将动物病毒和人类病毒进行重组, 并在和人类最类似的组织细胞内传代, 增强其对与人类亲近的动物致病性, 直至可攻击人. 2. 将动物病原体 (目前主要为病毒) 以各种方式和途径, 攻击与人类细胞受体十分相似的或与人类近亲的动物, 并做多种多样的许多次传代, 最终使之适应在该种动物群体内传播, 再通过类似方式部分适应于人群. 笔者暂称为 '人制人病原体动物群体性适应试验.' 3. 兼用上述 2 种方法."

⁹⁴ Ibid, p. 97. For the original study, see Yoshihiro Kawaoka, et. al., "Experimental Adaptation of an Influenza H5 HA Confers Respiratory Droplet Transmission to a Reassortant H5 HA/H1N1 Virus in Ferrets," *Nature*, 486, pg. 420-428, 02 May 2012.

⁹⁵ Xu Dezhong (徐德忠) and Li Feng (李锋), eds., *The Unnatural Origin of SARS and New Species of Artificial Viruses as Genetic Weapons* (非典非自然起源和人制人新种病毒基因武器) (Beijing, China: Academy of Military Medical Sciences Press, August 2015), pg. 13-14, 51, 59, 84-85, 94-97.

⁹⁶ Ibid, pg. 51.

⁹⁷ Byung Uk Lee, "Minimum Sizes of Respiratory Particles Carrying SARS-CoV-2 and the Possibility of Aerosol Generation," *International Journal of Environmental Research and Public Health*, 2020 Oct; 17(19): 6960. Published online 23 September 2020.

⁹⁸ For an excellent analysis of the WIV's published work that demonstrates their proficiency with these gain-of-function techniques, see Yuri Deigin, "Lab-Made? SARS-CoV-2 Genealogy Through the Lens of Gain-of-Function Research," *Medium.com*, 22 April 2020.

⁹⁹ Xu Dezhong (徐德忠) and Li Feng (李锋), eds., *The Unnatural Origin of SARS and New Species of Artificial Viruses as Genetic Weapons* (非典非自然起源和人制人新种病毒基因武器) (Beijing, China: Academy of Military Medical Sciences Press, August 2015), pg. 62.

¹⁰⁰ Ibid, pg. 58.

¹⁰¹ Ibid.

¹⁰² Ibid, pg. 47.

¹⁰³ Ibid, pg. 61-62.

¹⁰⁴ Ibid, pg. 43, 100-103.

¹⁰⁵ Ibid, pg. 43-44.

¹⁰⁶ Ibid, pg. 84-85.

¹⁰⁷ Ibid, pg. 85. The quoted text is "使用当代基因武器之目的主要不是军事企图, 而是重要的恐怖威胁, 政治和地区或国际战略需求."

¹⁰⁸ Ibid, pg. 59. The quoted text is "政治斗争." While he did not mention biowarfare, Xi Jinping would deliver an entire speech dedicated to "political struggle" in 2019. See, "Xi Jinping Delivers Important Speech at the Opening Ceremony of the Central Party School's (Chinese Academy of Governance) Young Cadres Training Class" (习近平在中央党校 (国家行政学院) 中青年干部培训班开班式上发表重要讲话), *Xinhua News Agency* re-posted on the *Central Government of the People's Republic of China* (Online), 03 September 2019.

¹⁰⁹ The quoted text is "若采用当代基因武器, 则隐蔽, 难于取证; 即使提供学术证据甚至病毒和动物等实证, 亦可百般抵赖, 阻止和压制, 使国际组织和争议人士无可奈何." Xu Dezhong (徐德忠) and Li Feng (李锋), eds., *The*

Unnatural Origin of SARS and New Species of Artificial Viruses as Genetic Weapons (非典非自然起源和人制人新病毒基因武器) (Beijing, China: Academy of Military Medical Sciences Press, August 2015), pg. 85.

¹¹⁰ Ibid, pg. 86. The quoted text is “当代基因武器则高明得多, 使靶目标区意想不到, 防不胜防, 甚至思想混乱, 不明白真相; 更不堪设想和令人痛心的是, 可能个别人盲目地认为现在不具备生产和施放 ‘当代基因武器’ 的企图和条件, 其结果无意地, 或多或少地妨碍了对基因武器施放来源之查寻。”

¹¹¹ Ibid, pg. 90.

¹¹² The quoted text is “基因武器难以检测, 难以预防, 难以隔离, 而且成本极低...” See, Zhang Qiang (张强), “Genetic Weapons: a Pandora’s Box Worthy of Vigilance” (基因武器 : 值得警惕的 “潘多拉” 魔盒), *Science and Technology Daily* reprinted in the *PLA Daily*, 06 November 2017.

¹¹³ Sharri Markson, *What Really Happened in Wuhan* (Sydney, Australia: HarperCollins Publishers, September 2021), pg. 312.

¹¹⁴ For Li’s affiliation, see the page “Editorial Committee Members Division of Labor and Institutional Affiliations, Titles” (编委会成员分工和单位, 职称) at the beginning of *The Unnatural Origin of SARS and New Species of Artificial Viruses as Genetic Weapons*. No page number was given.

¹¹⁵ The quoted text is “病原溯源与快速检测.” See “Academy of Military Medical Science Institute of Microbiology and Epidemiology Researcher Yang Ruifu Invited to Deliver the Ge Hong Lecture” (军事医学科学院微生物流行病学研究所杨瑞馥研究员受邀葛洪论坛), *Wuhan Institute of Virology*, 09 December 2016.

¹¹⁶ Ibid. Interestingly, Yang’s lecture reportedly did not focus on viral pathogens, but rather on the bacterium *Yersinia pestis*, the causative agent of the plague, with a secondary discussion of two other bacteria, *vibrio parahaemolyticus* and *escherichia coli* (O104:H4).

¹¹⁷ For an early example in which Dr. Yang partnered with six WIV researchers, see Dian-Bing Wang, Ruifu Yang, Zhi-Ping Zhang, et. al., “Detection of B. Anthracis Spores and Vegetative Cells with the Same Monoclonal Antibodies,” *PLOS One*, 4(11): e7810, 13 November 2009. For a more recent example of Yang’s collaboration with nine other PLA researchers and two researchers at the WIV, see Jing Yuan, Xiao Wei, Xiangna Zhao, et. al., “High Alcohol-Producing Klebsiella Pneumonia is a Bacterial Culprit of Fatty Liver Disease,” *Cell Metabolism*, 01 October 2019; 30(4): pg. 675-688, online publication 19 September 2019. The most recent example we could identify was Yang partnering with the WIV’s Shi Zhengli. See Nils Chr. Stenseth, Guha Dharmarajan, Ruiyun Li, Zheng-li Shi, Ruifu Yang, and George F. Gao, “Lessons Learnt From the COVID-19 Pandemic,” *Frontiers in Public Health Journal*, Volume: 9, 02 August 2021.

¹¹⁸ Katherine Eban, “The Lab Leak Theory: Inside the Fight to Uncover COVID-19’s Origins,” *Vanity Fair*, 03 June 2021.

¹¹⁹ Sharri Markson, *What Really Happened in Wuhan* (Sydney, Australia: HarperCollins Publishers, September 2021), pg. 313-314.

¹²⁰ “Xi Jinping Signs Order Giving Meritorious Service Award to One Work Unit and 24 Individuals,” (习近平签署通令给 1 单位 24 个人记功), *Xinhua News Agency* reprinted in the *People’s Liberation Army Daily*, 27 August 2014.

¹²¹ Richard P. Suttmeier, Cong Cao, and Denis Fred Simon, “China’s Innovation Challenge and the Remaking of the Chinese Academy of Sciences,” *Innovations Journal* (Summer 2006), MIT University Press: Cambridge, MA, p. 79-80.

¹²² Hans Kühner, “Between Autonomy and Planning: The Chinese Academy of Science in Transition,” *Minerva*, Vol. 22, No. 1 (March 1984), p.13.

¹²³ Jordan Wilson, “Experts in Defense: How China’s Academicians Contribute to its Defense Science and Technology Development,” *SITC Research Briefs*, No. 10, University of California San Diego, 10 January 2015, p. 2; and Cao Cong, Li Ning, Li Xia, and Liu Li, “Reform of China’s Science and Technology System in the Xi Jinping Era,” *China: An International Journal*, Volume 16, Number 3 (August 2018), p. 137.

¹²⁴ Jordan Wilson, “Experts in Defense: How China’s Academicians Contribute to its Defense Science and Technology Development,” *SITC Research Briefs*, No. 10, University of California San Diego, 10 January 2015, p. 2.

¹²⁵ Cao Cong, Li Ning, Li Xia, and Liu Li, “Reform of China’s Science and Technology System in the Xi Jinping Era,” *China: An International Journal*, Volume 16, Number 3, August 2018, p. 137.

¹²⁶ The Chinese is “中国科学院武汉病毒研究所.”

¹²⁷ Tai Ming Cheung, *Fortifying China: The Struggle to Build a Modern Defense Economy*, Cornell Univ. Press: Ithaca, NY, 2009, p. 89.

¹²⁸ In the words of two Chinese scholars: “China’s state-led system positions a top-down approach with the party-state as the key driver of S&TI development and emphasizes the central leadership and coordination.” See Yutao

Sun and Cong Cao, "Planning for Science: China's 'Grand Experiment' and Global Implications," *Humanities and Social Sciences Communications Journal*, Vol. 8, Article Number: 215, 20 September 2021.

¹²⁹ For an example of the lack of independence in universities, see Anna Fifield, "In Xi Jinping's China, a Top University can No Longer Promise Freedom of Thought," *The Washington Post*, 18 December 2019.

¹³⁰ Hans Kühner, "Between Autonomy and Planning: The Chinese Academy of Science in Transition," *Minerva*, Vol. 22, No. 1, March 1984, p. 23.

¹³¹ "Threats to the U.S. Research Enterprise: China's Talent Recruitment Plans," Staff Report of the Permanent Subcommittee on Investigations of the U.S. Senate, January 2020, p. 23-24.

¹³² See "State Council Organization Chart," the official website of *The State Council of the People's Republic of China*, 28 August 2014.

¹³³ Office of the Secretary of Defense, "2019 Annual Report to Congress: Military and Security Developments Involving the People's Republic of China," *U.S. Department of Defense*, 02 May 2019, p. 97-98.

¹³⁴ Tai Ming Cheung, *Fortifying China: The Struggle to Build a Modern Defense Economy* (Cornell Univ. Press: Ithaca, NY, 2009), p. 205.

¹³⁵ The Office of the Spokesperson of the U.S. Department of State, "Fact Sheet: Activity at the Wuhan Institute of Virology," *U.S. Department of State*, 15 January 2021; Eva Dou, "Wuhan Lab's Classified Work Complicates Search for Pandemic's Origins," *The Washington Post*, 22 June 2021.

¹³⁶ For an example, see Xi Jinping's 2018 speech to CAS and CAE researchers, particularly passages such as "广大工程科技工作者既要有工匠精神, 又要有团结精神, 围绕国家重大战略需求, 瞄准经济建设和事关国家安全的重大工程科技问题, 紧贴新时代社会民生现实需求和军民融合需求, 加快自主创新成果转化应用, 在前瞻性, 战略性领域打好主动仗." See, "Xi Jinping: Speech to the Chinese Academy of Sciences' 19th Plenary Meeting of Academicians and the Chinese Academy of Engineering's 14th Plenary Meeting of Academicians" (习近平: 在中国科学院第十九次院士大会, 中国工程院第十四次院士大会上的讲话), *Xinhua News Agency*, 28 May 2018.

¹³⁷ There are numerous published studies that involve PLA-CAS research collaboration, including many cited throughout this report, but for a very recent example of an ongoing PLA-CAS partnership, see the December 2021 study on colonic inflammatory disorders conducted by a 12-person research group at the PLA AMMS led by Zhang Lingqiang, and a 7-person research group at the CAS Institute of Microbiology led by Liu Cuihua. Notice that the journal omits the AMMS affiliation from the description of the authors on Zhang's team. Omissions occur frequently when authors from AMMS and other PLA institutions publish in English language journals. Bo Wu, Lihua Qiang, Yong Zhang, et. al., "The Deubiquitinase OTUD1 Inhibits Colonic Inflammation by Suppressing RIPK1-Mediated NF-κB Signaling," *Cellular & Molecular Immunology*, Volume 19, 07 December 2021, pg. 276-289.

¹³⁸ For an example, see "Suzhou Institute of Nano-Tech and Nano-Bionics Holds Academic Conference and Ceremony to Appoint Gao Zhixian of the Chinese Academy of Military Medical Science a Visiting Researcher," (苏州纳米所举行中国军事医学科学院高志贤客座研究员聘任仪式暨学术报告会), *Nanjing Branch of the Chinese Academy of Sciences*, 17 December 2013.

¹³⁹ For a reference to the PLA No. 306 Hospital undergoing joint training with the CAS Institute of Biophysics, see AMMS authors Li Xiang (李翔), Tan Bin (谈彬), Xu Chi (徐池), Xu Tianhao (徐天昊), and Mao Junwen (毛军文), "Thoughts on Promoting Deep Military-Civil Fusion Development in Biopharmaceutical Science and Technology" (推进生物医药科技军民融合深度发展的思考), *Chinese Journal of Medical Science Research Management* (中华医学科研管理杂志), Vol. 31, No. 4 (31 August 2018), p. 246.

¹⁴⁰ For an example involving experts in synthetic biology and precision medicine, see "Academy of Military Medical Science Institute of Bioengineering Researcher and Professor Ye Qinong Visits the Institute of Biomedical Engineering for Exchange" (军事医学科学院生物工程研究所研究员叶棋浓教授到医工所交流访问), *Suzhou Institute of Biomedical Engineering and Technology Chinese Academy of Sciences*, 11 July 2016.

¹⁴¹ Tai Ming Cheung, *Fortifying China: The Struggle to Build a Modern Defense Economy* (Cornell Univ. Press: Ithaca, NY, 2009), p. 205.

¹⁴² Jordan Wilson, "Experts in Defense: How China's Academicians Contribute to its Defense Science and Technology Development," *SITC Research Briefs*, No. 10, University of California San Diego, 10 January 2015, p. 7-8.

¹⁴³ For an example of a contemporaneous intelligence report from 1960, since declassified, which referenced the role of CAS in developing the PRC's nuclear weapons, see "The Chinese Communist Atomic Energy Program,"

Tracking the Dragon: National Intelligence Estimates on China During the Era of Mao, 1948-1976, Government Printing Office: Pittsburgh, PA, October 2004, p. 295.

¹⁴⁴ For a recent example in which Xi Jinping invokes the legacy of CAS in the nuclear weapons program, see “Scientific and Technological Innovation, a Powerful Engine for a World-Class Military – The Fourth Document on the Leadership and Promotion of the Party Central Committee with Comrade Xi Jinping at its Core and the Strengthening of the Military and Revitalization of the Military” (科技创新，迈向世界一流军队的强大引擎——以习近平同志为核心的党中央领导和推进强军兴军纪实之四), *Xinhua News Agency* posted on the *Central Government of the People’s Republic of China* (Online), 15 September 2017.

¹⁴⁵ Nicholas D. Kristof, “Nie Rongzhen, 93, Last Marshal Of China’s Communist Revolution,” *The New York Times*, 16 May 1992.

¹⁴⁶ Tai Ming Cheung, *Fortifying China: The Struggle to Build a Modern Defense Economy*, Cornell Univ. Press: Ithaca, NY, 2009, p. 50.

¹⁴⁷ *Ibid*, p. 205.

¹⁴⁸ Evan A. Feigenbaum, “Who’s Behind China’s High-Technology ‘Revolution’?: How Bomb Makers Remade Beijing’s Priorities, Policies, and Institutions,” *International Security*, MIT Press: Cambridge, MA: Summer 1999, Vol. 24, No. 1, p. 112.

¹⁴⁹ Yangyang Cheng, “When Scientists Become Soldiers,” *University of Chicago Magazine*, Fall 2021, Volume 114, Number 1; and “Chinese Nuclear Program,” *Atomic Heritage Foundation* (Online), 19 July 2018.

¹⁵⁰ The quoted text is “毛主席高兴地对钱学森说：‘听说美国人把你当成五个师呢！我看呀，对我们来说，你比五个师的力量大得多。’” See, “Recollections of Qian Xuesen: Two Bombs, One Satellite, A Miracle Forged through Loving Care” (回忆钱学森：两弹一星，关怀铸就奇迹), *Niucheng Evening News* reposted on the *Chinese Academy of Engineering* (Online), 03 March 2015.

¹⁵¹ Evan A. Feigenbaum, “Who’s Behind China’s High-Technology ‘Revolution’?: How Bomb Makers Remade Beijing’s Priorities, Policies, and Institutions,” *International Security*, MIT Press: Cambridge, MA: Summer 1999, Vol. 24, No. 1, p. 109; Michael Pillsbury, *The Hundred-Year Marathon*, Henry Holt and Company, New York: 2015, p. 139-140.

¹⁵² Evan A. Feigenbaum, “Who’s Behind China’s High-Technology ‘Revolution’?: How Bomb Makers Remade Beijing’s Priorities, Policies, and Institutions,” *International Security*, MIT Press: Cambridge, MA: Summer 1999, Vol. 24, No. 1, p. 109.

¹⁵³ *Ibid*, p. 110.

¹⁵⁴ “Faculty and Students at Wuhan Institute of Virology Assemble to Watch the 2018 National Broadcast of Teaching and Educational Lectures on Building Scientific Ethics and Academic Discipline” (武汉病毒所师生集中观看 2018 年全国科学道德和学风建设宣讲教育报告会直播), *Wuhan Institute of Virology* (Online), 16 October 2018.

¹⁵⁵ It is worth noting that the 719 Research Institute appears on the U.S. Department of Commerce Entity List, to which U.S. exports are restricted without a license. No such restrictions at present apply to the Wuhan Institute of Virology. See 83424 Federal Register, Vol. 85, No. 246, December 22, 2020, Rules and Regulations.

¹⁵⁶ Tai Ming Cheung, *Fortifying China: The Struggle to Build a Modern Defense Economy*, Cornell Univ. Press: Ithaca, NY, 2009, p. 67.

¹⁵⁷ It is worth adding that the 719 Research Institute also belongs to the state-owned China Shipbuilding Industry Corporation. For more information, see “Wuhan Second Ship Design and Research Institute (719 Institute)” [武汉第二船舶设计研究所 (719 所)], *Hubei Provincial People’s Government* (Online), 09 July 2015.

¹⁵⁸ Jordan Wilson, “Experts in Defense: How China’s Academicians Contribute to its Defense Science and Technology Development,” *SITC Research Briefs*, No. 10, University of California San Diego, 10 January 2015, p. 2.

¹⁵⁹ Kenneth Allen and Mingzhi Chen, “The People’s Liberation Army’s Academic Institutions,” *Air University China Aerospace Studies Institute* (Online), 11 June 2020, p. 123, 192, 219, and 223.

¹⁶⁰ Kevin Pollpeter and Kenneth W. Allen, eds, *The PLA as Organization v2.0*, Defense Technical Information Center (Online), 14 June 2012, p. 248. 256.

¹⁶¹ Jordan Wilson, “Experts in Defense: How China’s Academicians Contribute to its Defense Science and Technology Development,” *SITC Research Briefs*, No. 10, University of California San Diego, 10 January 2015, p. 4; and Tai Ming Cheung, “Keeping Up with the *Jundui*: Reforming the Chinese Defense Acquisition, Technology and Industrial System,” in *Chairman Xi Remakes the PLA: Assessing Chinese Military Reforms*, ed. Phillip C. Saunders, et al., Washington, DC: National Defense University Press, 2019, p. 592.

¹⁶² Jordan Wilson, “Experts in Defense: How China’s Academicians Contribute to its Defense Science and Technology Development,” *SITC Research Briefs*, No. 10, University of California San Diego, 10 January 2015, p. 4.

¹⁶³ Tai Ming Cheung, “Keeping Up with the *Jundui*: Reforming the Chinese Defense Acquisition, Technology and Industrial System,” in *Chairman Xi Remakes the PLA: Assessing Chinese Military Reforms*, ed. Phillip C. Saunders, et al., Washington, DC: National Defense University Press, 2019, p. 594.

¹⁶⁴ See, “AWARDEE OF MEDICAL SCIENCES AND MATERIA MEDICA PRIZE: WU ZUZE,” *The HoLeung Ho Lee Foundation* (Online), 2006; Shen Jifei (沈基飞) and Zhao Feng (赵锋), “The Chinese Father of Blood Generating Stem Cells’ Wu Zuze Has a Minor Planet Named After Him” (中国新闻网: ‘中国造血干细胞之父’ 吴祖泽获小行星命名), *China News* re-posted on the *Chinese Academy of Sciences* (Online), 30 November 2015.

¹⁶⁵ Ibid; and “Wu Zuze,” *China Vitae* (Online), last accessed on 20 May 2022.

¹⁶⁶ Tai Ming Cheung, “Keeping Up with the *Jundui*: Reforming the Chinese Defense Acquisition, Technology and Industrial System,” in *Chairman Xi Remakes the PLA: Assessing Chinese Military Reforms*, ed. Phillip C. Saunders, et al., Washington, DC: National Defense University Press, 2019, p. 616-617.

¹⁶⁷ Ibid, p. 599. In addition, see Xi’s speech to the All-Military Equipment Work Conference on December 3, 2014, an excerpt from which can be found in *Selections from Xi Jinping’s Discourse on the Holistic View of National Security* (习近平关于总体国家安全观论述摘编), Central Party Literature Press, Beijing: 01 April 2018, p. 57.

¹⁶⁸ Greg Levesque, “Commercialized Militarization: China’s Military-Civil Fusion Strategy,” *The National Bureau of Asian Research* (Online), 30 June 2021.

¹⁶⁹ Hui-Ming Tung (董慧明), *The Metamorphosis and Development of Mainland China’s National Defense Science and Technology Industry* (中国大陆国防科技工业的蜕变与发展), (Wunan Publishing Company: Taipei, April 2019), p. 72-73.

¹⁷⁰ Tai Ming Cheung, “Keeping Up with the *Jundui*: Reforming the Chinese Defense Acquisition, Technology and Industrial System,” in *Chairman Xi Remakes the PLA: Assessing Chinese Military Reforms*, ed. Phillip C. Saunders, et al., Washington, DC: National Defense University Press, 2019, p. 598-599.

¹⁷¹ Quoted in Brian Lafferty, “Civil-Military Integration and PLA Reforms,” in *Chairman Xi Remakes the PLA: Assessing Chinese Military Reforms*, ed. Phillip C. Saunders, et al., Washington, DC: National Defense University Press, 2019, p. 629-630.

¹⁷² Ibid, p. 634.

¹⁷³ “Intel Brief: China’s Military-Civil Fusion Strategy,” *The Soufan Center* (Online), 13 August 2020.

¹⁷⁴ Emily de La Bruyere and Nathan Picarsic, “Defusing Military-Civil Fusion,” *The Foundation for the Defense of Democracies* (Online), 27 May 2021; and “The Chinese Academy of Sciences and the Academy of Military Sciences Sign Strategic Cooperation Framework Agreement” (中科院与军事科学院签署战略合作框架协议), *Chinese Academy of Sciences* (Online), 23 March 2018.

¹⁷⁵ Bai Chunli (白春礼), “New Trends in Science and Technology Development that will Form the Future (The Trend of the Times)” (创造未来的科技发展新趋势, 大势所趋), *The People’s Daily*, 05 July 2015.

¹⁷⁶ Timothy R. Heath, Kristen Gunness, and Cortez A. Cooper, *The PLA and China’s Rejuvenation*, RAND National Defense Research Institute: Santa Monica, 2016, p. 41.

¹⁷⁷ The quoted text is “现在, 我军人才队伍规模有了很大改善, 但战略科学家, 科技帅才十分匮乏, 领军人才, 尖子人才十分缺乏.” See “Scientific and Technological Innovation, a Powerful Engine for a World-Class Military – The Fourth Document on the Leadership and Promotion of the Party Central Committee with Comrade Xi Jinping at its Core and the Strengthening of the Military and Revitalization of the Military” (科技创新, 迈向世界一流军队的强大引擎——以习近平同志为核心的党中央领导和推进强军兴军纪实之四), *Xinhua News Agency* posted on the *Central Government of the People’s Republic of China* (Online), 15 September 2017.

¹⁷⁸ Brian Lafferty, “Civil-Military Integration and PLA Reforms,” in *Chairman Xi Remakes the PLA: Assessing Chinese Military Reforms*, ed. Phillip C. Saunders, et al., Washington, DC: National Defense University Press, 2019, p. 630-632.

¹⁷⁹ Tai Ming Cheung, *Fortifying China: The Struggle to Build a Modern Defense Economy*, (Cornell Univ. Press: Ithaca, NY, 2009), p. 205.

¹⁸⁰ Alex Stone and Peter Wood, “China’s Military-Civil Fusion Strategy: A View from Chinese Strategists,” *China Aerospace Studies Institute of the Air University* (Online), 15 June 2020, p. 12. Note that in keeping with the 2017

reforms, the PLA Academy of Military Medical Sciences, the WIV's main partner, and the PLA Institute for Chemical Defense are now incorporated into the PLA Academy of Military Science.

¹⁸¹ The quoted text is drawn from “根据协议，未来双方将重点围绕联合建设高端战略智库、联合开展项目合作研究、共同推动协同创新平台建设、联合培养人才和促进人员交流等方面深化合作。” See, “The Chinese Academy of Sciences and the Academy of Military Sciences Sign Strategic Cooperation Framework Agreement” (中科院与军事科学院签署战略合作框架协议), *Chinese Academy of Sciences* (Online), 23 March 2018.

¹⁸² Ibid.

¹⁸³ The quoted text is “把军民融合发展上升为国家战略, 是我们长期探索经济建设和国防建设协调发展规律的重大成果... 是应对复杂安全威胁, 赢得国家战略优势的重大举措... 加快形成全要素, 多领域, 高效益的军民融合深度发展格局, 逐步构建军民一体化的国家战略体系和能力.” *Selections from Xi Jinping's Discourse on the Holistic View of National Security* (习近平关于总体国家安全观论述摘编), Central Party Literature Press, Beijing: 01 April 2018, p. 65. Xi delivered the speech on 20 June 2017.

¹⁸⁴ The quoted text is “海洋, 太空, 网路空间, 生物, 新能源等领域军民共用行强, 要在筹划设计, 组织实施, 成果使用全过程贯彻军民融合理念和要求, 抓紧解决好突出问题, 加快形成多维一体, 协同推进, 跨越发展的新兴领域军民融合发展格局.” Quoted in “Academician Li Chongyin Interprets Xi Jinping's Thought on Science and Technology Innovation,” *China Science Daily* (中国科学报), 21 February 2019.

¹⁸⁵ See, “Xi Jinping Attends Plenary Meeting of the People's Liberation Army Delegation” (习近平出席解放军代表团全体会议), *Xinhua News Agency*, 12 March 2017.

¹⁸⁶ The quoted text is “也要发挥中科院, 高等院校, 民口和民营企业的潜力, 最大限度实现民为军用.” Xinhua did not include this line from Xi's remarks in its news report of the meeting. Xi's speeches generally appear in a redacted form in the summaries and transcripts issued by the PRC state media. Senator Rubio's staff, however, obtained a report internal to the PLA that included the quoted text.

¹⁸⁷ Ibid. The text from which the quote was taken is “要借助地方科研院所, 装备研制单位等的科技优势.”

¹⁸⁸ The quoted text is “当年, 如果没有钱学森, 钱三强, 邓稼先等一批科学大家, ‘两弹一星’ 是搞不出来的.” See “Scientific and Technological Innovation, a Powerful Engine for a World-Class Military – The Fourth Document on the Leadership and Promotion of the Party Central Committee with Comrade Xi Jinping at its Core and the Strengthening of the Military and Revitalization of the Military” (科技创新, 迈向世界一流军队的强大引擎——以习近平同志为核心的党中央领导和推进强军兴军纪实之四), *Xinhua News Agency* posted on the *Central Government of the People's Republic of China* (Online), 15 September 2017.

¹⁸⁹ Wei Hongtao (魏宏涛), “How to Transform the Research and Development Results of the Chinese Academy of Sciences into Military Products?” (如何将中科院的科研成果转化为军品), *The People's Liberation Army Daily*, 16 December 2017.

¹⁹⁰ Ibid. The quoted text is “做出了不可替代的重要贡献.”

¹⁹¹ Ibid. The quoted text is “除参与重大国防科技专项的明星技术外, 在庞大的中科院科研系统内部, 还有海量的科研成果. 其中许多优秀技术不仅民用价值极大, 军用前景也十分广阔.”

¹⁹² Ibid.

¹⁹³ Ibid. The quoted text is “科研院所在参与军民融合的过程中, 务必坚持军事需求为牵引.”

¹⁹⁴ The quoted text is “我们着力推动经济建设和国防建设融合发展, 深化国防科技工业体制改革, 提高军民协同创新能力, 完善军民协同创新机制.” See “Xi Jinping: Speech to the Chinese Academy of Sciences' 19th Plenary Meeting of Academicians and the Chinese Academy of Engineering's 14th Plenary Meeting of Academicians” (习近平: 在中国科学院第十九次院士大会、中国工程院第十四次院士大会上的讲话), *Xinhua News Agency*, 28 May 2018.

¹⁹⁵ Ibid. Note that Xi is talking about pooling personnel and resources from the civilian world and the military and the two-way transfer of technologies with dual applications between them, not helping individuals make a career transition between the two. The quoted text is “要加快构建军民融合发展体系... 清除 ‘民参军,’ ‘军转民’ 障碍.”

¹⁹⁶ Tai Ming Cheung, “Keeping Up with the *Jundui*: Reforming the Chinese Defense Acquisition, Technology and Industrial System,” in *Chairman Xi Remakes the PLA: Assessing Chinese Military Reforms*, ed. Phillip C. Saunders, et al., Washington, DC: National Defense University Press, 2019, p. 600.

¹⁹⁷ The quoted phrase is “孕育新的变革.” See “Xi Jinping: Speech to the Chinese Academy of Sciences’ 19th Plenary Meeting of Academicians and the Chinese Academy of Engineering’s 14th Plenary Meeting of Academicians” (习近平：在中国科学院第十九次院士大会、中国工程院第十四次院士大会上的讲话), *Xinhua News Agency*, 28 May 2018.

¹⁹⁸ For a general record of the speech, see “Xi Jinping Attends Plenary Meeting of the People’s Liberation Army Delegation” (习近平出席解放军代表团全体会议), *Xinhua News Agency*, 12 March 2017. The quotes were extracted from the following clauses and sentences: “推动科技兴军,” and “特别是人工智能, 网路信息, 生物交叉, 微纳材料等前沿科技领域, 各大国展开激烈角逐,” and “我们必须增强紧迫感.”

¹⁹⁹ The quoted text is “生物医药科技领域进行军民融合得到高层广泛认可.” See, Li Xiang (李翔), Tan Bin (谈彬), Xu Chi (徐池), Xu Tianhao (徐天昊), and Mao Junwen (毛军文), “Thoughts on Promoting Deep Military-Civil Fusion Development in Biopharmaceutical Science and Technology” (推进生物医药科技军民融合深度发展的思考), *Chinese Journal of Medical Science Research Management* (中华医学科研管理杂志), Vol. 31, No. 4, 31 August 2018, p. 245.

²⁰⁰ Ibid, p. 246. The quoted text is “生物医药科技军民通用性强, 具有天然的军民融合属性, 易于融合, 故通过加强军地联合, 互通有无, 协调统筹... 发挥各方优势力量, 实现从科研计划, 项目申报, 合作研发, 成果应用, 资源共享等全链条融合.”

²⁰¹ Ibid, p. 248. The quoted text is “将生物医药科技领域军民融合作为指导国家实验室建立的重要依据与任务目标,” and “加快向战斗力, 保障力与生产力转化.”

²⁰² The quoted text is “加快军民深度融合发展.” See, “The General Office of the CCP Central Committee and the General Office of the State Council Release the ‘Overall Plan Regarding the Systematic Promotion of Comprehensive Innovation Reform Experiments in Some Areas’” (中共中央办公厅、国务院办公厅印发“关于在部分区域系统推进全面改革创新试验的总体方案”), *Xinhua News Agency* re-posted on the *Central Government of the People’s Republic of China* (Online), 07 September 2015.

²⁰³ The quoted text is “国家军民融合创新示范区” and “促进军民融合深度发展, 支持军民两用技术双向转移转化.” See, General Office of the Wuhan Municipal People’s Government, “Wuhan Municipal 2020 Government Work Report” (武汉市 2020 年政府工作报告), *Wuhan Municipal People’s Government* (Online), 11 January 2020.

²⁰⁴ The quoted text is “与其他行业相比, 生物医药行业发展更加薄弱, 研究所建设生物安全大科学中心, 要面向国民经济主战场, 契合国家需求, 在解决人类疫病及保护国家生物安全上发挥重要作用.” See, “The Party Branch of the Wuhan Institute of Virology’s Research Center for Molecular Virology Convenes Special Organizational Life Meeting on ‘Staying True to our Original Aspiration, Keeping Firmly in Mind our Mission’” (武汉病毒所分子病毒学研究中心党支部召开“不忘初心, 牢记使命”专题组织生活会), *Wuhan Institute of Virology* (Online), 29 September 2018.

²⁰⁵ David Cyranoski, “Inside the Chinese Lab Poised to Study the World’s Most Dangerous Pathogens,” *Nature* 542, pages 399–400 (2017), 23 February 2017.

²⁰⁶ Tai Ming Cheung, “Keeping Up with the *Jundui*: Reforming the Chinese Defense Acquisition, Technology and Industrial System,” in *Chairman Xi Remakes the PLA: Assessing Chinese Military Reforms*, ed. Phillip C. Saunders, et al., Washington, DC: National Defense University Press, 2019, p. 597.

²⁰⁷ Ryan Clarke and Lam Peng Er, “Coronavirus Research in China: Origins, International Networks, and Consequences,” Non-Traditional Security (NTS)-Asia Consortium, Nanyang Technological University Singapore, 20 May 2021, p. 16. Clarke clarified to Senator Rubio’s staff that he had personally observed the now deleted reference to the Military Management Division on the WIV’s website.

²⁰⁸ See Fang Li, Et. al., “Molecular Mechanism for Antibody-Dependent Enhancement of Coronavirus Entry,” *Journal of Virology*, Volume 94, Issue 5, March 2020.

²⁰⁹ See Ke Peng and Wei Liu, Et. al., “Calcium Channel Blockers Reduce Severe Fever with Thrombocytopenia Syndrome Virus (SFTSV) Related Fatality,” *Cell Research*, Volume 29, 23 August 2019, pg. 739-753.

²¹⁰ Ibid. The researchers from the PLA AMMS Institute of Microbiology and Epidemiology were Li Hao, Zhang Shaofei, Dai Ke, Hu Yuanyuan, Wang Zhibo, Zhang Panhe, and Liu Wei. Two researchers from the PLA 154 Hospital, Cui Ning and Yuan Chun, also participated in the study as did Bai Jieying from the AMMS Laboratory Animal Center. It is worth noting that the WIV research group included Xiao Gengfu, the Secretary-General of the CCP Committee at the WIV.

²¹¹ Note that Peter Daszak of the EcoHealth Alliance was a coauthor and the direct recipient of the U.S. government funding. Daszak worked with the WIV as a sub-grantee. See Zhou Peng, Fan Hang, Yang Xinglou, Et. al., “Fatal Swine Acute Diarrhea Syndrome Caused by an HKU2-related Coronavirus of Bat Origin,” *Nature*, Volume 556, 04 April 2018, pg. 255-258.

²¹² See “Wuhan Institute of Virology’s Researcher Wang Hanzhong Wins First Class Award from the Chinese People’s Liberation Army for Medical Achievements” (武汉病毒所王汉中研究员获中国人民解放军医疗成果一等奖), Wuhan Institute of Virology (Online), 30 November 2015.

²¹³ The Office of the Spokesperson of the U.S. Department of State, “Fact Sheet: Activity at the Wuhan Institute of Virology,” *U.S. Department of State* (Online), 15 January 2021.

²¹⁴ Sharri Markson and Ashleigh Gleeson, “The Covid Files: How the Red Army Oversaw Coronavirus Research,” *The Daily Telegraph*, 11 May 2020.

²¹⁵ Sharri Markson, *What Really Happened in Wuhan*, (Sydney, Australia: HarperCollins Publishers, September 2021), pg. 279, 316.

²¹⁶ *Ibid*, pg. 369-372.

²¹⁷ See “Scientists Make Major Breakthrough in a Design Element of Vaccine for Middle East Respiratory Syndrome” (科学家在中东呼吸综合征冠状病毒疫苗设计方面取得重大突破), *Wuhan Institute of Virology* (Online), 25 November 2016.

²¹⁸ According to his profile on the WIV website, Qiu studied at the PLA AMMS Institute of Microbiology and Epidemiology from January 2013 to December 2017. See “Doctoral Advisors: Qiu Yang” (博士生导师: 邱洋), *Wuhan Institute of Virology* (Online), 24 December 2020.

²¹⁹ Sun Xingwei (孙兴维) and Zhang Zhenwei (张振威), “Group of Military Experts Storm Deep into the Epidemic Area, Tent-Style Mobile Testing Labs Enter Operations” (军队专家组深入疫区攻关 帐篷式移动检测实验室投入运行), *People’s Liberation Army Daily*, 31 January 2020.

²²⁰ Minnie Chan and William Zheng, “Meet the Major General on China’s Coronavirus Scientific Front Line,” *The South China Morning Post*, 03 March 2020; Sharri Markson, *What Really Happened in Wuhan*, (Sydney, Australia: HarperCollins Publishers, September 2021), pg. 358, 364; Anna Fifield, “‘Wolf Warrior’ Strives to Make China First with Coronavirus Vaccine,” *The Washington Post*, 22 March 2020.

²²¹ A British journalist with nearly two decades of experience reporting from Beijing for the *South China Morning Post* noted that the outside world did not know until after the fall of the Soviet Union that its bioweapons program, Biopreparat, had used influenza preparedness as a pretext to provide plausible deniability for its covert efforts to develop bioweapons at ostensibly civilian research facilities like the WIV. Chen’s assignment to take over the WIV could suggest that the PLA had a similar presence at the WIV. See, Jasper Becker, *Made in China: Wuhan, Covid, and the Quest for Biotech Supremacy*, (London: C. Hurst & Co. Ltd., 2021), p. 168.

²²² The quoted text is “建立完善国家和军队协作的全国分级实验室工作网.” See, Wei Xiaoqing (魏晓青) and Wang Yumin (王玉民), “The Realistic Threat of Biological Terrorism and Medical Countermeasures” (生物恐怖的现实威胁与医学对策), *China Military Science* (中国军事科学), Volume 32, No. 3, June 2008, p. 282-283.

²²³ *Ibid*, p. 283. The quoted text is “军民结合的原则”和“建设必要的高等级生物安全 (BSL-3 和 BSL-4) 实验室, 并加强这些实验室的设施和技术装备建设, 提高重要病原微生物实验室监测, 检测能力.”

²²⁴ The WIV’s BSL-4 lab was approved in 2003 and construction began in 2004. See, David Cyranoski, “Inside the Chinese Lab Poised to Study the World’s Most Dangerous Pathogens,” *Nature* 542, pages 399–400 (2017), 23 February 2017.

²²⁵ Rodolphe de Maistre, Gilles Demaneuf, and Billy Bostickson, “Wuhan Institute of Biological Products Co.,” *Research Gate*, preprint March 2021, p. 5.

²²⁶ Sinopharm, in turn, answers to the State-owned Assets Supervision and Administration Commission of the PRC State Council. For the ownership structure, see “Brief Survey of the Enterprise” (企业概况), *Wuhan Institute of Biological Products* (武汉生物制品研究所有限责任公司) (Online), last accessed on 27 March 2022. <http://www.wibp.com.cn/Chs/Detail.aspx?id=1>

²²⁷ Rodolphe de Maistre, Gilles Demaneuf, and Billy Bostickson, “Wuhan Institute of Biological Products Co.,” *Research Gate*, preprint March 2021, p. 13.

²²⁸ *Ibid*, p. 14-15.

²²⁹ “‘Wuhan Emerging Infectious Diseases Research Coalition’ is Founded in Wuhan” (‘武汉新发传染病研究联盟’在汉成立), *Wuhan Institute of Virology* (Online), 16 December 2008.

²³⁰ “Wuhan Institute of Virology Strengthens Cooperation and Exchange with the Wuhan Institute of Biological Products,” (武汉病毒所加强与武汉生物制品研究所的合作交流), *Wuhan Institute of Virology* (Online), 10 June 2014.

²³¹ Eric Crodgy, “Chinese Chemical and Biological Warfare Capabilities,” in *China and Weapons of Mass Destruction: Implications for the United States*, U.S. National Intelligence Council, 05 November 1999.

²³² Eric Crodgy, “China’s Role in the Chemical and Biological Disarmament Regimes,” *The Nonproliferation Review*, Spring 2002, p. 27-28.

²³³ Dany Shoham, “China’s Biological Warfare Programme: An Integrative Study with Special Reference to Biological Weapons Capabilities,” *Journal of Defence Studies*, Vol. 9, No. 2, April-June 2015, p. 141-144, 148.

²³⁴ *Ibid*, p. 142. These agents reportedly include anthrax, plague, brucellosis, botulinum, SARS, yellow fever, Hantan virus, Japanese encephalitis, tick-borne encephalitis, typhoid, and dysentery.

²³⁵ “The Unfolding of China’s Changsheng Vaccine Scandal,” *Reuters*, 24 July 2018. Yang Wanli, “Wuhan Vaccine Factory Restarted,” *The China Daily*, 27 July 2018.

²³⁶ Jasper Becker, *Made in China: Wuhan, Covid, and the Quest for Biotech Supremacy*, (London: C. Hurst & Co. Ltd., 2021), p. 62.

²³⁷ Yang Wanli, “Wuhan Vaccine Factory Restarted,” *The China Daily*, 27 July 2018.

²³⁸ Cao Cong, Li Ning, Li Xia, and Liu Li, “Reform of China’s Science and Technology System in the Xi Jinping Era,” *China: An International Journal*, Volume 16, Number 3, August 2018, p. 138.

²³⁹ *Ibid*, p. 122.

²⁴⁰ The quoted text is “技术的‘卡脖子’问题是国外关键核心技术断供造成的直接结果。” See Xing Dongmei (邢冬梅), “The Causes of the Problem of ‘Stranglehold’ Technologies and [How to] Avoid Them” (‘卡脖子’技术问题的成因与规避), *National Governance* (国家治理) reprinted on the *People’s Forum* (Online), 23 December 2020.

²⁴¹ The quote is taken from the introductory summary of an excellent translation of a PRC government text published in 2018 that outlines some of the specific technologies that PRC authorities categorize as “stranglehold technologies,” see “35 Key ‘Stranglehold’ Technologies,” from the PRC Ministry of Education as translated by the Georgetown University Center for Security and Emerging Technology (Online), 16 August 2021.

²⁴² Emphasis added. The quoted text is “针对产业薄弱环节，实施好关键核心技术攻关工程，尽快解决一批“卡脖子”问题。” See “Xi Jinping Time: Enhance Innovative Capabilities to Solve the ‘Stranglehold’ Problem” (习近平时间|提高创新能力 解决“卡脖子”问题), *Xinhua News Agency*, 27 December 2020.

²⁴³ Cao Cong, Li Ning, Li Xia, and Liu Li, “Reform of China’s Science and Technology System in the Xi Jinping Era,” *China: An International Journal*, Volume 16, Number 3, August 2018, p. 123.

²⁴⁴ *Ibid*, p. 126.

²⁴⁵ *Ibid*, p. 139. For discussion of longstanding tensions between CAS and the Ministry of Science and Technology, see Richard P. Suttmeier, Cong Cao, and Denis Fred Simon, “China’s Innovation Challenge and the Remaking of the Chinese Academy of Sciences,” *Innovations Journal*, Summer 2006, MIT University Press: Cambridge, MA, p. 90-91.

²⁴⁶ *Ibid*, p. 81-82.

²⁴⁷ Cao Cong, Li Ning, Li Xia, and Liu Li, “Reform of China’s Science and Technology System in the Xi Jinping Era,” *China: An International Journal*, Volume 16, Number 3, August 2018, p. 125.

²⁴⁸ *Ibid*. The operative phrase is “四个率先。”

²⁴⁹ The quoted text is “四个率先”：率先实现科学技术跨越发展，率先建成国家创新人才高地，率先建成国家高水平科技智库，率先建设国际一流科研机构。” See Ding Jia (丁佳), “Chinese Academy of Sciences Issues New Guiding Principles for its Offices and the Academy: Three Orientations, Four Firsts” (中科院发布办院新方针：三个面向 四个率先), *Science Net.cn*, 13 February 2015.

²⁵⁰ Cao Cong, Li Ning, Li Xia, and Liu Li, “Reform of China’s Science and Technology System in the Xi Jinping Era,” *China: An International Journal*, Volume 16, Number 3, August 2018, p.129.

²⁵¹ The second was built at the Harbin Veterinary Research Institute, which opened in 2018. Ryan Clarke and Lam Peng Er, “Coronavirus Research in China: Origins, International Networks, and Consequences,” Non-Traditional Security (NTS)-Asia Consortium, Nanyang Technological University Singapore, 20 May 2021, p. 12, 17-18.

²⁵² Cao Cong, Li Ning, Li Xia, and Liu Li, “Reform of China’s Science and Technology System in the Xi Jinping Era,” *China: An International Journal*, Volume 16, Number 3, August 2018, p. 133, 138.

²⁵³ Declan Butler, “Engineered Bat Virus Stirs Debate over Risky Research,” *Nature* (2015), 12 November 2015.

²⁵⁴ David Cyranoski, “Inside the Chinese Lab Poised to Study the World’s Most Dangerous Pathogens,” *Nature* 542, pages 399–400 (2017), 23 February 2017.

²⁵⁵ Nicholas Wade, “The Origin of COVID: Did People or Nature Open Pandora’s Box at Wuhan?,” *Bulletin of the Atomic Scientists*, 05 May 2021. Jasper Becker, *Made in China: Wuhan, Covid, and the Quest for Biotech Supremacy*, (London: C. Hurst & Co. Ltd., 2021), p. 170-171.

²⁵⁶ Jasper Becker, *Made in China: Wuhan, Covid, and the Quest for Biotech Supremacy*, (London: C. Hurst & Co. Ltd., 2021), p. 171.

²⁵⁷ Andrew Silver, “Taiwan’s Science Academy Fined for Biosafety Lapses After Lab Worker Contracts COVID-19,” *Science Magazine*, 24 January 2022.

²⁵⁸ This was because of its low virulence and because it largely infected young people, as older people had immunity from prior infections in 1949-1950. See, Martin Furmanski, “Laboratory Escapes and the ‘Self-Fulfilling Prophecy’ Epidemics,” *Center for Arms Control and Nonproliferation* (Online), 17 February 2014, p. 3.

²⁵⁹ *Ibid.*

²⁶⁰ *Ibid.*, p. 4.

²⁶¹ *Ibid.*

²⁶² *Ibid.*

²⁶³ For an overview of the debate about gain-of-function research, see Michael J. Imperiale and Arturo Casadevall, “A New Approach to Evaluating the Risk-Benefit Equation for Dual-Use and Gain-of-Function Research of Concern,” *Frontiers in Bioengineering and Biotechnology*, Volume 6, Article 21, 08 March 2018.

²⁶⁴ See “Cambridge Working Group Consensus Statement on the Creation of Potential Pandemic Pathogens,” *The Cambridge Working Group* (Online), 14 July 2014.

²⁶⁵ “Doing Diligence to Assess the Risks and Benefits of Life Sciences Gain-of-Function Research,” *The White House* (Online), 17 October 2014.

²⁶⁶ Sara Reardon, “US Government Lifts Ban on Risky Pathogen Research,” *Nature Magazine*, 19 December 2017.

²⁶⁷ Ralph S. Baric, et al., “A SARS-like Cluster of Circulating Bat Coronaviruses Shows Potential for Human Emergence,” *Nature Medicine*, Volume 21, pages 1508–1513 (2015), published on 09 November 2015.

²⁶⁸ Declan Butler, “Engineered Bat Virus Stirs Debate over Risky Research,” *Nature* (2015), 12 November 2015.

²⁶⁹ *Ibid.*

²⁷⁰ The quoted text is “发现部分课题组和支撑部门在菌毒种保藏和实验活动方面有不规范之处，存在安全隐患。” See, “Wuhan Institute of Virology Launches Biosafety Inspection Work of Pathogen Microbiology Labs” (武汉病毒所开展病原微生物实验室生物安全检查工作), *Wuhan Institute of Virology* (Online), 20 January 2011. In all fairness, the report referred to the lab having received good marks in some areas. The inspection team also put forward recommendations to improve biosafety conditions. One curious note: While this report was dated January 20, 2011, the webpage URL and the time stamp from Google search results indicate that the report was not posted on the WIV website until November 11, 2019, which is concurrent when the WIV appears to have been dealing with a major incident.

²⁷¹ The quoted text is “综合安全检查中发现的问题提出有针对性的安全管理要求。” See, “Wuhan Institute of Virology Convenes 2019 Safety and Security Work Conference” (武汉病毒所召开 2019 年度安全工作会议), *Wuhan Institute of Virology* (Online), 08 April 2019.

²⁷² *Ibid.* The quoted text is “以近期全国各科研生产安全过程中的具体案例为警醒，要求进一步筑牢安全思想防线。”

²⁷³ Alina Chan and Matt Ridley, *Viral: The Search for the Origin of COVID-19*, (Harper Collins Publishers: New York, November 2021), pg. 136-137.

²⁷⁴ *Ibid.*, pg. 137. Jasper Becker, *Made in China: Wuhan, Covid, and the Quest for Biotech Supremacy*, (London: C. Hurst & Co. Ltd., 2021), p. 172.

²⁷⁵ Jasper Becker, *Made in China: Wuhan, Covid, and the Quest for Biotech Supremacy*, (London: C. Hurst & Co. Ltd., 2021), p. 172.

²⁷⁶ *Ibid.*, p. 174, 176.

²⁷⁷ *Ibid.*, p. 175.

²⁷⁸ Ibid, p. 175-176. “Exchange and Discussion During the French Embassy in China and French Consulate General in Wuhan’s Visit to the Wuhan Institute of Virology” (法国驻华大使馆、法国驻武汉领事馆一行赴武汉病毒所交流座谈), *Wuhan Institute of Virology* (Online), 30 January 2019.

²⁷⁹ Quoted in Alina Chan and Matt Ridley, *Viral: The Search for the Origin of COVID-19*, (Harper Collins Publishers: New York, November 2021), pg. 137-138.

²⁸⁰ “Xi Jinping Gives Important Speech to Launch Study Session on Implementing the Spirit of the 18th Party Congress” (习近平在学习贯彻党的十九大精神研讨班开班式上发表重要讲话), *Xinhua* as reposted on the *Central Government of the People’s Republic of China* (Online), 05 January 2018.

²⁸¹ The original quote was: “2018 年 1 月 5 日，习近平总书记在学习贯彻党的十九大精神研讨班开班式上列举了 8 个方面 16 个风险，其中特别讲到‘像非典那样的重大传染性疾病，也要时刻保持警惕，严密防范’。” Zhu Xiaodong (注晓东) and Tong Siyu (童丝雨), “People’s Daily Well-Known Article: Make an Offensive Move, Wage the Proactive War – Summaries of the Important Remarks of General Secretary Xi Jinping on Guarding Against and Neutralizing Major Risks” (人民日报著名文章：下好先手棋，打好主动仗 – 习近平总书记关于防范化解重大风险重要论述综述), *People’s Daily* (15 April 2021) as reposted on the *PRC Ministry of Public Security* (Online), 23 April 2021.

²⁸² “Xi Jinping Gives Important Speech to Launch Study Session on Implementing the Spirit of the 18th Party Congress” (习近平在学习贯彻党的十九大精神研讨班开班式上发表重要讲话), *Xinhua* as reposted on the *Central Government of the People’s Republic of China* (Online), 05 January 2018.

²⁸³ The WIV has two campuses. Its original campus, which is co-located with the Wuhan Branch of the Chinese Academy of Sciences, resides in the Xiao Hongshan Park in the central Wuhan district of Wuchang (武昌区). That facility contains BSL-2 and BSL-3 laboratories that have been in operation for many years. The WIV’s second campus is located in an outlying district of Wuhan called Jiangxia (江夏) in the Zhengdian Research Industrial Park (郑店科研园区). This newer campus houses the BSL-4 laboratory, China’s first facility built at the highest level of biocontainment. It was also officially designated a “National Biosecurity Laboratory.” The Zhengdian Park campus has BSL-2 and BSL-3 laboratories, which are located adjacent to the Wuhan Institute of Biological Products.

²⁸⁴ Josh Rogin, “State Department Cables Warned of Safety Issues at Wuhan Lab Studying Bat Coronaviruses,” *Washington Post*, April 14, 2020.

²⁸⁵ Ibid.

²⁸⁶ “Ministry of Science and Technology Press Conference on ‘Accelerating the Building of an Innovative Country’: Transcript of Remarks” (科技部就“加快建设创新型国家”答记者问：文字实录), the *PRC Ministry of Science and Technology* (Online), 10 March 2018.

²⁸⁷ Chinese Academy of Sciences Bureau of Major R&D Programs and Science and Technology Strategy Consultation Research Institute, “Meeting Convened to Launch ‘The Chinese Academy of Sciences Deepening the Advancement of Military-Civil Fusion Development Research’ Program” (“中科院深入推进军民融合发展研究”项目启动会召开), *Chinese Academy of Sciences* (Online), 19 March 2019.

²⁸⁸ Ibid. Specifically, they were drawn from the Strategic Planning Bureau of the Military-Civil Fusion Office of the CCP Central Committee (中央军民融合办公室战略规划局), the Comprehensive Planning Bureau of the Equipment Development Department of the Central Military Commission (军委装备发展综合计划局), the CMC Science and Technology Committee’s Science and Technology Strategy Bureau (军委科技委科技战略局), the Military-Civil Fusion Bureau of the Strategic Planning Office of the CMC (军委战略规划办军民融合局), the Research and Development Bureau of the PLA Academy of Military Science (军事科学院科研部), the Bureau of Major R&D Programs at CAS (中科院重大任务局), the Bureau of Development & Planning at CAS (中科院发展规划局), the Bureau of Facility Support and Budget at CAS (中科院条件保障与财政局), the CAS Center for Project Management (中科院项目管理中心), and various leaders, representatives and experts hailing from around 30 CAS research institutes (中科院近 30 个研究所和相关单位的负责人, 代表, 专家).

²⁸⁹ Ibid. The quoted text is “形成军民融合发展战略研究的长效机制.”

²⁹⁰ Ibid. The quoted text is “相里斌在总结讲话强调，启动“中科院深入推进军民融合发展研究”项目是中科院落实习近平总书记关于军民融合发展战略指示要求，特别是贯彻落实今年 3 月 2 日习近平总书记在十九届中央军民融合发展委员会第一次全体会议上的重要讲话和 3 月 12 日习近平总书记在出席十三届全国人大一次会议解放军和武警部队代表团全体会议时的重要讲话的具体举措。”

²⁹¹ See, “Xi Jinping Opens the 19th Party Congress Central Committee’s First Plenary Meeting of the Military-Civil Fusion Strategy Commission” (习近平主持召开十九届中央军民融合发展委员会第一次全体会议), *Xinhua News Agency*, 02 March 2018.

²⁹² See, “Xi Jinping Attends Plenary Meeting of the People’s Liberation Army Delegation” (习近平出席解放军代表团全体会议), *Xinhua News Agency*, 12 March 2017.

²⁹³ The quoted text is “也要发挥中科院, 高等院校, 民口和民营企业的潜力, 最大限度实现民为军用.” *Xinhua* did not include this line from Xi’s remarks in its news report of the meeting. Xi’s speeches generally appear in a redacted form in the summaries and transcripts issued by the PRC state media. Senator Rubio’s staff, however, obtained a report internal to the PLA that included the quoted text.

²⁹⁴ The quoted text is “根据协议, 未来双方将重点围绕联合建设高端战略智库, 联合开展项目合作研究, 共同推动协同创新平台建设, 联合培养人才和促进人员交流等方面深化合作.” See, “The Chinese Academy of Sciences and the Academy of Military Sciences Sign Strategic Cooperation Framework Agreement” (中科院与军事科学院签署战略合作框架协议), *Chinese Academy of Sciences*, 23 March 2018.

²⁹⁵ *Ibid.*

²⁹⁶ “Biosafety Management Regulations for Laboratories that Study Pathogenic Microorganisms” (病原微生物实验室生物安全管理条例), *State Affairs Bulletin* (国务公报) posted on the *Central Government of the People’s Republic of China* (Online), First Supplementary Issue of 2019 (1 增刊), 2019.

²⁹⁷ The quoted text is “第二十二条第一款中的‘取得从事高致病性病原微生物实验活动资格证书的实验室’修改为‘三级、四级实验室’.” See, “2018 Revised Edition: Biosafety Management Regulations for Laboratories that Study Pathogenic Microorganisms,” (2018 修订版: 病原微生物实验室生物安全管理条例), the *China Antimicrobial Resistance Surveillance System* (全国细胞耐药监测网), 09 April 2018.

²⁹⁸ *Ibid.* The quoted text is “第二十六条修改为: ‘国务院卫生主管部门和兽医主管部门应当定期汇总并互相通报实验室数量和实验室设立, 分布情况, 以及三级、四级实验室从事高致病性病原微生物实验活动的情况’.”

²⁹⁹ *Ibid.* Emphasis added. The quoted text is “第五十六条修改为: ‘三级、四级实验室未经批准从事某种高致病性病原微生物或者疑似高致病性病原微生物实验活动的, 由县级以上地方人民政府卫生主管部门, 兽医主管部门依照各自职责, 责令停止有关活动, 监督其将用于实验活动的病原微生物销毁或者送交保藏机构, 并给予警告; 造成传染病传播, 流行或者其他严重后果的, 由实验室的设立单位对主要负责人, 直接负责的主管人员和其他直接责任人员, 依法给予撤职, 开除的处分; 构成犯罪的, 依法追究刑事责任’.”

³⁰⁰ *Ibid.* The quoted text is “第六十一条中的‘由原发证部门吊销该实验室从事高致病性病原微生物相关实验活动的资格证书’修改为‘责令停止该项实验活动, 该实验室 2 年内不得申请从事高致病性病原微生物实验活动’.”

³⁰¹ The quoted text is “目的全面了解张家界市病原微生物实验室生物安全现状, 分析张家界市病原微生物实验室生物安全目前面临的突出问题, 提出对策, 消除实验室生物安全隐患.” See, Tian Xiaohui (田晓辉), Xiao Yongyue (肖永跃), Yang Yunhua (杨云华), and Tan Zhao (覃昭), “Analysis of Biosafety of Pathogenic Microorganism Laboratories in Zhangjiajie in 2018” (张家界 2018 年病原微生物实验室生物安全现状分析), *Chinese Journal of Public Health Management* (中国公共卫生管理), 2020 Vol. 1.

³⁰² *Ibid.* Emphasis added. The quoted text is “结果张家界市实验室生物安全状况不容乐观, 存在很多安全隐患, 包括职业暴露, 院内感染, 环境污染, 缺乏培训, 无证上岗, 管理体系不能有效运行, 单位领导不够重视和卫生主管部门监管缺失等.”

³⁰³ Sharon Lerner and Maia Hibbett, “Leaked Grant Proposal Details High-Risk Coronavirus Research,” *The Intercept*, 23 September 2021.

³⁰⁴ “Project DEFUSE: Defusing the Threat of Bat-Borne Coronaviruses,” EcoHealth Alliance Proposal Volume I, posted by *DRASTIC Research* (Online), proposal was submitted to DARPA on 27 March 2018, released online in September 2021, pg. 1, 11.

³⁰⁵ *Ibid.*, pg. 11.

³⁰⁶ Gary R. Whittaker, “SARS-CoV-2 Spike and its Adaptable Furin Cleavage Site,” *The Lancet*, Volume 2, Issue 10, e488-e489, 01 October 2021, published online on 06 August 2021.

³⁰⁷ Vineet D. Menachery, et. al., “Furin Cleavage Site Is Key to SARS-CoV-2 Pathogenesis,” Preprint, *BioRxiv*, 26 August 2020; Neil L. Harrison and Jeffrey D. Sachs, “A call for an independent inquiry into the origin of the SARS-CoV-

2 virus,” *Proceedings of the National Academy of Sciences of the United States of America* (PNAS), 2022, Vol. 119, No. 21, published 19 May 2022.

³⁰⁸ Gary R. Whittaker, “SARS-CoV-2 Spike and its Adaptable Furin Cleavage Site,” *The Lancet*, Volume 2, Issue 10, e488-e489, 01 October 2021, published online on 06 August 2021.

³⁰⁹ Neil L. Harrison and Jeffrey D. Sachs, “A call for an independent inquiry into the origin of the SARS-CoV-2 virus,” *Proceedings of the National Academy of Sciences of the United States of America* (PNAS), 2022, Vol. 119, No. 21, published 19 May 2022.

³¹⁰ *Ibid.*

³¹¹ “Project DEFUSE: Defusing the Threat of Bat-Borne Coronaviruses,” EcoHealth Alliance Proposal Volume I, posted by *DRASTIC Research* (Online), proposal was submitted to DARPA on 27 March 2018, released online in September 2021, pg. 1.

³¹² Sharon Lerner and Maia Hibbett, “Leaked Grant Proposal Details High-Risk Coronavirus Research,” *The Intercept*, 23 September 2021. 23 September 2021.

³¹³ Wu Jia (吴佳), Yuan Zhiming (袁志明), Tang Hao (唐浩), Liu Jun (刘军), Qin Hao (秦颢), Liu Yi (刘毅), and Wang Lin (王林), “A Disinfectant Solution for Surfaces in High-Level Biosafety Laboratories and Related Preparation Methods,” (一种用于高等级生物安全实验室的物表消毒液及其制备方法), *National Intellectual Property Administration of China* (Online), application date 13 November 2020, patent authorization date 09 November 2021, Patent Authorization Number: CN 112262846 B.

³¹⁴ For the work on golden Syrian hamsters, see Nisha K. Duggal, et. al., “Infectious SARS-CoV-2 Is Emitted in Aerosol Particles,” *mBio* (American Society for Microbiology), Volume 12, No. 5, 19 October 2021.

³¹⁵ Emphasis added. Rowen Jacobsen, “‘We Never Created a Supervirus.’ Ralph Baric Explains Gain-of-Function Research,” *MIT Technology Review*, 26 July 2021.

³¹⁶ Liu Yizhan (刘奕湛), “National Security, You and I Work Diligently Together! Summary of National Security Education Day Activities for all the People” (国家安全，你我共同努力！全民国家安全教育日活动综述), *Xinhua News Agency* re-posted by *PLA Daily*, 16 April 2018.

³¹⁷ “The General Public Enters the Chinese Center for Disease Control and Prevention to Push Aside the Mysterious Veil of ‘Biosecurity’” (公众走进中国疾控中心拨开‘生物安全’神秘面纱), *Xinhua News Agency*, 15 April 2017. Zhang Lei (张磊) and Li Yuanqiu (李媛秋), “The General Public Enters Biosafety Laboratories” (公众走进生物安全实验室), *Disease Surveillance* (疫病监测), 2017.

³¹⁸ Changchun municipality in Jilin province was the example cited. Liu Yizhan (刘奕湛), “National Security, You and I Work Diligently Together! Summary of National Security Education Day Activities for all the People” (国家安全，你我共同努力！全民国家安全教育日活动综述), *Xinhua News Agency* re-posted by *PLA Daily*, 16 April 2018.

³¹⁹ *Ibid.* The subtle implication of the Chinese statement was the CCDCP would not ordinarily have access to PLA facilities, and in fact, the PLA generally operates with minimal coordination with PRC government ministries.

³²⁰ The quoted text is “我们坚持党对科技事业的领导，健全党对科技工作的领导体制，发挥党的领导政治优势。” See “Xi Jinping: Speech to the Chinese Academy of Sciences’ 19th Plenary Meeting of Academicians and the Chinese Academy of Engineering’s 14th Plenary Meeting of Academicians” (习近平：在中国科学院第十九次院士大会、中国工程院第十四次院士大会上的讲话), *Xinhua News Agency*, 28 May 2018.

³²¹ *Ibid.* The quoted text is “在关键领域，卡脖子的地方下大功夫，集合精锐力量，作出战略性安排，尽早取得突破，力争实现我国整体科技水平从跟跑向并行，领跑的战略性转变，在重要科技领域成为领跑者，在新兴前沿交叉领域成为开拓者，创造更多竞争优势。”

³²² *Ibid.* The quoted text is “科学技术从来没有像今天这样深刻影响着国家前途命运。”

³²³ *Ibid.* The quoted text is “有的历史性交汇期也可能擦肩而过。”

³²⁴ *Ibid.* The quoted text is “要高标准建设国家实验室，推动大科学计划，大科学工程，大科学中心，国际科技创新基地的统筹布局和优化。”

³²⁵ Cao Cong, Li Ning, Li Xia, and Liu Li, “Reform of China’s Science and Technology System in the Xi Jinping Era,” *China: An International Journal*, Volume 16, Number 3, August 2018, p. 138.

³²⁶ The quoted text is “广大工程科技工作者既要有工匠精神，又要有团结精神，围绕国家重大战略需求，瞄准经济建设和事关国家安全的重大工程科技问题，紧贴...军民融合需求，加快自主创新成果转化应用，在前瞻性、战略性领域打好主动仗。” “Xi Jinping: Speech to the Chinese Academy of Sciences’ 19th Plenary Meeting of

Academicians and the Chinese Academy of Engineering's 14th Plenary Meeting of Academicians" (习近平：在中国科学院第十九次院士大会、中国工程院第十四次院士大会上的讲话), *Xinhua News Agency*, 28 May 2018.

³²⁷ "Ministry of Science and Technology and Ministry of Finance Several Opinions on Strengthening the Construction of State Key Laboratories" (科技部财政部关于加强国家重点实验室建设发展的若干意见), the *Ministry of the Science and Technology of the People's Republic of China* (Online), MOST 2018 Document No. 64, 22 June 2018.

³²⁸ Jasper Becker, *Made in China: Wuhan, Covid, and the Quest for Biotech Supremacy*, (London: C. Hurst & Co. Ltd., 2021), p. 168.

³²⁹ The quoted text is "与全面加强基础科学研究建设世界科技强国的要求相比, 还存在重大原创性成果缺乏, 世界一流领军科学家不足, 管理体制机制亟待深化等问题." See, "Ministry of Science and Technology and Ministry of Finance Several Opinions on Strengthening the Construction of State Key Laboratories" (科技部财政部关于加强国家重点实验室建设发展的若干意见), the *Ministry of the Science and Technology of the People's Republic of China* (Online), MOST 2018 Document No. 64, 22 June 2018.

³³⁰ Ibid. The quoted text is "加强协同创新, 推动军民融合."

³³¹ Ibid. The quoted text is "军民共建" 和 "优化调整."

³³² Jasper Becker, *Made in China: Wuhan, Covid, and the Quest for Biotech Supremacy*, (London: C. Hurst & Co. Ltd., 2021), p. 174, 176.

³³³ "The Unfolding of China's Changsheng Vaccine Scandal," *Reuters*, 24 July 2018.

³³⁴ Eli Meixler, "Outrage in China over Latest Vaccine Safety Scandal," *Time Magazine*, 23 July 2018.

³³⁵ Ibid.

³³⁶ The quoted text is "强调确保药品安全是各级党委和政府义不容辞之责, 要始终把人民群众的身体健康放在首位... 完善我国疫苗管理体制, 坚决守住安全底线, 全力保障群众切身利益和社会安全稳定大局." See Li Xiaokang (李小康), "To Pass a Good Law for the Country and Increase the Well-Being of the People: Highlights of Chairman Li Zhanshu Leading the National People's Congress Investigation and Research Group to Hunan to Launch Legislative Research and Investigation" (为国家立良法为人民增福祉: 栗战书委员长率全国人大调研组到湖南开展立法调研侧记), *The People's Congress of China Magazine* (中国人大), No. 15, Vol. 483, 05 August 2019, pg.8.

³³⁷ "Wuhan National Biosecurity Laboratory: A Treasure of the Nation, Mission of a Generation" (武汉国家生物安全实验室：国之重器, 时代使命), *Chinese Academy of Sciences* (Online), 18 November 2020.

³³⁸ Yuan Zhiming, "Current Status and Future Challenges of High-Level Biosafety Laboratories in China," *Journal of Biosafety and Biosecurity*, Volume 1, Issue 2, September 2019, p. 124.

³³⁹ "China's First Biosafety Level 4 Lab Put into Operation," *Xinhua* re-posted on the *State Council of the People's Republic of China* (Online), 04 January 2018.

³⁴⁰ The quoted text is "于 2017 年正式投入使用." See, Yu Hao (于浩), "Put the Physical Health of the People in the Highest Place from the Beginning to the End: Highlights from the National People's Congress Standing Committee Launching of an Infectious Disease Prevention Law Enforcement Inspection" ("始终把人民群众的身体健康放在首位: 全国人大常委会开展传染病防治法执法检查侧记), *The People's Congress of China Magazine* (中国人大), No. 16, Vol. 460, 20 August 2018, pg. 7.

³⁴¹ The quoted text is "传染病防治法执法检查组." See, Yu Hao (于浩), "Put the Physical Health of the People in the Highest Place from the Beginning to the End: Highlights from the National People's Congress Standing Committee Launching of an Infectious Disease Prevention Law Enforcement Inspection" ("始终把人民群众的身体健康放在首位: 全国人大常委会开展传染病防治法执法检查侧记), *The People's Congress of China Magazine* (中国人大), No. 16, Vol. 460, 20 August 2018, pg. 4-7.

³⁴² Ibid.

³⁴³ Ibid, pg. 7.

³⁴⁴ "Wuhan Institute of Virology Party Committee Convenes Central Group Plenary Study Session" (武汉病毒所党委召开中心组（扩大）学习会议), *Wuhan Institute of Virology* (Online), 12 September 2018; and "The Comprehensive Management General Party Branch of the Wuhan Institute of Virology Convenes Specialized Study Meeting on 'Staying True to our Original Aspiration, Keeping Firmly in Mind our Mission'" (武汉病毒所综合管理党总支召开 "不忘初心, 牢记使命" 专题学习会), *Wuhan Institute of Virology* (Online), 20 September 2018.

³⁴⁵ The quoted text is “陈新文从中科院当前工作的短板和不足...” See “Wuhan Institute of Virology Party Committee Convenes Central Group Plenary Study Session” (武汉病毒所党委召开中心组（扩大）学习会议), *Wuhan Institute of Virology* (Online), 12 September 2018.

³⁴⁶ Ibid. The quoted text is “提出必须紧紧抓住事关国家全局和长远发展的关键领域和卡脖子问题。”

³⁴⁷ The quoted text is “技术的‘卡脖子’问题是国外关键核心技术断供造成的直接结果。” See Xing Dongmei (邢冬梅), “The Causes of the Problem of ‘Stranglehold’ Technologies and [How to] Avoid Them” (‘卡脖子’技术问题的成因与规避), *National Governance* (国家治理) reprinted on the *People’s Forum* (Online), 23 December 2020.

³⁴⁸ The quote is taken from the introductory summary of an excellent translation of a PRC government text published in 2018 that outlines some of the specific technologies that PRC authorities categorize as “stranglehold technologies,” see “35 Key ‘Stranglehold’ Technologies,” from the PRC Ministry of Education as translated by the *Georgetown University Center for Security and Emerging Technology* (Online), 16 August 2021.

³⁴⁹ Emphasis added. The quoted text is “我们科技总体上与发达国家比有差距, 要采取‘非对称’赶超战略, 发挥自己的优势, 特别是到二零五零年都不可能赶上的核心技术领域, 要研究‘非对称’性赶超措施, 在国际上, 没有核心技术的优势就没有政治上的强势. 在关键领域, 卡脖子的地方要下大功夫. 军事上也是如此.” See Xi’s speech after hearing the report from the Ministry of Technology on August 21, 2013, an excerpt from which can be found in *Selections from Xi Jinping’s Discourse on the Holistic View of National Security* (习近平关于总体国家安全观论述摘编), Central Party Literature Press, Beijing: 01 April 2018, p. 155.

³⁵⁰ The quoted text is “他强调, 研究所要在院党组的领导下, 进一步明确未来一个时期发展思路何工作重点, 推进生物安全大科学中心建设... 完善研究所保密管理体系建设工作... 进一步加强党建工作, 认真抓好基层党组织建设, 为研究所科技创新提供坚强的政治和组织保证.” See “Wuhan Institute of Virology Party Committee Convenes Central Group Plenary Study Session” (武汉病毒所党委召开中心组（扩大）学习会议), *Wuhan Institute of Virology* (Online), 12 September 2018.

³⁵¹ Ibid. The quoted text is “当前我国科技发展形式逼人, 挑战逼人, 使命逼人, 我们必须始终坚持需求导向, 问题导向, 目标导向的原则, 面向国家需求, 明确自己的科研定位, 着力为解决短板和卡脖子问题, 为实现中华民族伟大复兴, 为国家, 为人民做贡献.” Note that 中华民族的伟大复兴 is most often translated as the “great rejuvenation of the Chinese *nation*,” and elsewhere in this report where it is appropriate, we use that translation. But a word of warning is in order: 民族 is *not* synonymous with “country” in the way that nation is now frequently used in English. And in certain contexts, such as Xiao’s comment here, the word 民族 is closer to the meaning of “race” or “ethnic group” in English than to “nation,” at least in its contemporary usage. This point is illustrated by Xiao’s drawing of a distinction not only between the “nation/country” (国家) and the “people” (人民), but also the “race” (民族). Xiao is not being redundant. The three terms he uses are distinct in Chinese. Hence our use of “race” to translate 民族 in this instance. CCP leaders often speak of 民族 in terms that encompass ethnic Chinese people worldwide regardless of their citizenship or national identity, because in the minds of the CCP, biological lineage determines one’s 民族, not personal identity or where one calls home.

³⁵² The quoted text is “要深入学习习近平总书记关于科技创新重要讲话精神, 认真对标党中央, 国务院对科技创新工作的新要求新部署, 准确把握院党组的决策部署和工作要求, 进一步增强使命感紧迫感危机感...” See “The Comprehensive Management General Party Branch of the Wuhan Institute of Virology Convenes Specialized Study Meeting on ‘Staying True to our Original Aspiration, Keeping Firmly in Mind our Mission’” (武汉病毒所综合管理党总支召开“不忘初心, 牢记使命”专题学习会), *Wuhan Institute of Virology* (Online), 20 September 2018.

³⁵³ The quoted text is “习近平强调, 强化责任担当, 狠抓贯彻落实... 推动科技协同创新, 加快推动军民融合深度发展.” See, “Xi Jinping Opens the Second Meeting of the 19th Party Congress Central Committee’s Commission on Military-Civil Fusion Development” (习近平主持召开十九届中央军民融合发展委员会第二次会议), *Xinhua News Agency*, 15 October 2018.

³⁵⁴ Ibid. The quoted text is “要着力突破关键核心技术, 立足最复杂, 最困难的情况, 以工程建设为牵引, 集中优势力量协同攻关, 早日取得突破.”

³⁵⁵ Ibid. The quoted text is “要大幅度精简审批事项, 降低准入门槛, 降低制度性成本, 释放社会生产力.”

³⁵⁶ Zhiming Yuan, et. al., “Studies on Developing a Safe-Management Standard System for Chinese Biosafety Laboratories,” *Journal of Biosafety and Biosecurity*, Volume 1, Issue 1, March 2019, pg 39-45, first published online on 20 February 2019.

³⁵⁷ Ibid. Emphasis added.

³⁵⁸ Ibid.

³⁵⁹ See Wang Xiaoli (王小理) and Zhou Dongsheng (周冬生), “Looking toward International Biosecurity Situation in 2035,” (面向 2035 年的国际生物安全形势), *The Study Times* (学习时报), 20 December 2019. Note that the *Study Times* is published by the Central Party School of the CCP Central Committee.

³⁶⁰ From 2004 to 2013, Yuan was also the Secretary of the Chinese Communist Party Committee at the WIV. See Yuan’s bio on the WIV website. “Yuan Zhiming” (袁志明), *Wuhan Institute of Virology* (Online), 18 November 2021. http://www.whiov.cas.cn/yjsjy/zsxxjys/dsis/bssds/202111/t20211118_6263778.html

³⁶¹ “The Happiness and Glory to be Shared on the Historical Course to the Great Rejuvenation of the Chinese Race” (在实现中华民族伟大复兴的历史进程中共享幸福和荣光), *Xinhua News Agency* as reposted on the *PLA Daily*, 22 March 2018.

³⁶² Emphasis added. The quoted text is “在管理和支撑体系建设方面, 高等级生物安全实验室的法律法规和标准体系亟需进一步完善.” Yuan Zhiming (袁志明), Et. al., “Considerations about Improving the Planning of High-Level Biosafety Laboratory System in China, (关于加强我国高等级生物安全实验室体系规划的思考), *Bulletin of the Chinese Academy of Sciences* (中国科学院院刊), 2016, 31(10): 1248-1254.

³⁶³ Ibid. The quoted text is “我国在高等级生物安全实验室体系建设和管理方面存在一定问题. 目前全国仅建成 1 个四级实验室, 并且其关键设备的管理维护以及人员对四级实验室的标准化操作程序 (SOP) 的掌握还不够成熟.”

³⁶⁴ He Tieshan (何铁山), “The Basis of Biosafety Inspections of Laboratories Working with Pathogenic Microorganisms and Common Problems,” (病原微生物实验室生物安全监督依据及常见问题), Doc88.com, posted on 20 June 2020.

³⁶⁵ Maggie Huifu Wong, “Megacities and More: A Guide to China's Most Impressive Urban Centers,” *CNN*, 05 March 2019; and Xinlu Liang, “Alibaba’s Hometown Named China’s City with Most Economic Potential, But Who Else Tops the List?,” *South China Morning Post*, 08 September 2021.

³⁶⁶ The quoted text is “一, 二级实验室未按规定备案.” He Tieshan (何铁山), “The Basis of Biosafety Inspections of Laboratories Working with Pathogenic Microorganisms and Common Problems,” (病原微生物实验室生物安全监督依据及常见问题), Doc88.com, posted on 20 June 2020.

³⁶⁷ Ibid. The quoted text is “实验室入口无生物危险警示标识或标识内容不全, 出口无紧急撤离发光标志.”

³⁶⁸ Ibid. The quoted text is “实验室突发事件时对应应急预案的启动和实施不熟练.”

³⁶⁹ Ibid. The quoted text is “菌 (毒) 种样本来源, 保存, 实验项目等登记资料不全.”

³⁷⁰ Ibid. The quoted text is “保存菌 (毒) 种及阳性标本冰箱未双人双锁, 放置区域不符合防盗要求.”

³⁷¹ Ibid. The quoted text is “生物安全柜, 高压灭菌器等设备未按规定检测.”

³⁷² Ibid. The quoted text is “违规使用消毒产品: 紫外线消毒灯, 消毒剂, 消毒剂浓度测试卡等.”

³⁷³ Ibid. The quoted text is “废弃的培养基, 标本和菌种, 毒种保存液等高危险废物处置前未原地消毒.”

³⁷⁴ Ibid. The quoted text is “实验后标本去向管理不规范, 尤其是阳性标本.”

³⁷⁵ Ibid. The quoted text is “高压灭菌人员无上岗前培训证明.”

³⁷⁶ Ibid. The quoted text is “医疗废物交接不及时, 尤其是损伤性废物.”

³⁷⁷ Ibid. The quoted text is “实验室废水直接排放到医疗机构污水处理系统.”

³⁷⁸ Ibid. The quoted text is “实验室空气, 物本表面消毒监测不规范.”

³⁷⁹ Ibid. The quoted text is “实验室工作人员未按要求进行个人防护.”

³⁸⁰ Ibid. The quoted text is “实验室内存放与实验无关的物品, 过期试剂未及时清除.”

³⁸¹ Don Tse and Larry Ong, “Coronavirus Pushes CCP Factional Struggle to Inflection Point,” *SinoInsider*, April 2020, pg. 26.

³⁸² John Markoff and David Barboza, “2 Chinese Schools Said to be Linked to Online Attacks,” *The New York Times*, 18 February 2010; and Catalin Cimpanu, “Chinese Universities Connected to Known APTs are Conducting AI/ML Cybersecurity Research,” *The Record*, 11 March 2021.

³⁸³ Jing-Bao Nie, “He Jiankui’s Genetic Misadventure: Why Him? Why China?,” *The Hastings Center*, 05 December 2018.

³⁸⁴ Ibid.

³⁸⁵ The funding came from the PRC Ministry of Science and Technology, the Shenzhen Municipal Science and Technology Innovation Commission, and He’s university, according to a slide presentation prepared by He’s team, Chinese-language patient consent forms, and China’s clinical trial registry. See, Jane Qiu, “Chinese Government Funding May Have Been Used for ‘CRISPR Babies’ Project, Documents Suggest,” *STAT News*, 25 February 2019.

³⁸⁶ The Chinese phrase is “建设项目通过验收.” See, “Wuhan National Biosafety Laboratory Construction Project Passes Final Inspection and Approval” (武汉国家生物安全实验室建设项目通过验收), *Sohu.com News*, 27 December 2018. “Wuhan National Biosafety Lab Easily Passes State Inspection” (武汉国家生物安全实验室项目顺利通过国家验收), the *Hubei Provincial People’s Government Development and Reform Commission* (Online), 29 December 2018.

³⁸⁷ Yuan Zhiming, et. Al, “Biosafety Level 4 Laboratory User Training Program, China,” *Emerging Infectious Diseases* (Volume 25, Number 5), *U.S. Centers for Disease Control and Prevention* (Online), 26 March 2019.

³⁸⁸ “China Opens First Bio Safety Level 4 Laboratory,” U.S. State Department Cable from U.S. Embassy in Beijing, dated 19 January 2018, posted by the *Washington Post*, 14 April 2020.

³⁸⁹ Emphasis added. The quoted text is “为进一步加强和规范实验室生物安全管理工作, 审核实验室管理体系文件和相关生物安全风险评估报告, 防范生物安全事故.” See, “Wuhan National Biosafety Laboratory Receives 2018 Annual Biosafety Inspection,” (武汉国家生物安全实验室接受 2018 年度生物安全检查), *Wuhan Institute of Virology* (Online), 06 December 2018.

³⁹⁰ Ibid. The quoted text is “各位委员根据核查表内容, 对实验室生物安全管理, 生物安保管理, 科研活动管理及设施设备运维管理等四个方面进行了现场考察和文件审查...”

³⁹¹ Ibid. The quoted text is “各位委员专家积极发言, 共谋对策, 提出了意见及整改方案.”

³⁹² Ibid.

³⁹³ Ibid. The quoted text is “石正丽总结指出, 生物安全无小事, 与实验室人员的安全息息相关. 她强调, 各部门和工作人员要将制度和计划落到实处, 一定要做好相关汇总和记录; 同时要加强安全监管, 积极组织培训学习, 强化生物安全意识, 进一步制定和完善实验室生物安全管理制度, 推动实验室安全保障体系再上一台阶.”

³⁹⁴ The quoted text is “聚焦国家当前紧迫需求和长远发展战略需求的重大科技任务, 聚焦 ‘卡脖子’ 关键核心技术问题.” See, “Wuhan Branch Opens Fourth Quarter Party Building Work Advancement Meeting” (武汉分院召开第四季度党建工作推进会), *Wuhan Branch of the Chinese Academy of Sciences* (Online), 26 December 2018.

³⁹⁵ “Report of Investigation into Beijing Jiaotong University ‘December 26’ Accident is Released” (北京交通大学 “12·26” 事故调查报告公布), *Beijing Daily*, 13 February 2019.

³⁹⁶ Ibid.

³⁹⁷ See, “A Catalogue of and Brief Introductions for Projects Selected for 2018 National Natural Science Awards” (2018 年度国家自然科学奖获奖项目目录及简介), *PRC Ministry of Science and Technology* (Online), 08 January 2019.

³⁹⁸ Ibid. The quoted text is “中国蝙蝠携带重要病毒研究.”

³⁹⁹ The project number was Z-105-2-03.

⁴⁰⁰ “Research Project on Important Viruses Carried by Chinese Bats Wins State Natural Science Award Second Class,” (“中国蝙蝠携带重要病毒研究” 项目喜获国家自然科学二等奖), *Wuhan Institute of Virology* (Online), 09 January 2019; “The CCP Central Committee and State Council Holds Grand Award Ceremony for State Science and Technology Awards, Xi Jinping Attends the Ceremony and Gives Out Prizes to Highest Recipients” (中共中央国务院隆重举行国家科学技术奖励大会, 习近平出席大会并为最高奖获得者等颁奖), *Xinhua News Agency*, 08 January 2019. Note that the Xinhua piece describes the ceremony, but only names the recipients of the highest honors (Shi Zhengli won a second-class award). The WIV article details Shi’s prize.

⁴⁰¹ Sharri Markson, *What Really Happened in Wuhan*, (Sydney, Australia: HarperCollins Publishers, September 2021), pg. 206.

⁴⁰² Ibid.

⁴⁰³ The project authorization number is 31770175. See “Study of the Evolutionary Mechanism of bat SARS-like Coronaviruses Adaptation to Host Receptor Molecules and the Risk of Cross-Species Infection” (蝙蝠 SARS 样冠状病毒适应宿主受体分子的进化机制及其跨种感染的风险的研究), *MedSci.cn*, last accessed 02 March 2022.

⁴⁰⁴ The circular is labeled “Number 1” for 2019. It was issued on January 10 and released on the website on January 16. See, “Circular Regarding Going a Step Further to Strengthen Safety Inspection Work for Teaching Laboratories at Institutions of Higher Learning” (教育部办公厅关于进一步加强高校教学实验室安全检查工作的通知), *PRC Ministry of Education* (Online), 10 January 2019.

⁴⁰⁵ Ibid.

⁴⁰⁶ The quoted text is “坚持党对政法工作的绝对领导.” See, “Xi Jinping Attends Central Political Legal Commission Work Conference and Delivers Important Speech,” (习近平出席中央政法工作会议并发表重要讲话), *Xinhua News Agency*, 16 January 2019.

⁴⁰⁷ Ibid. The quoted text is “履行好维护国家政治安全, 确保社会大局稳定.”

⁴⁰⁸ Ibid. The quoted text is “习近平指出, 要旗帜鲜明把政治建设放在首位, 努力打造一支党中央放心...的高素质政法队伍.”

⁴⁰⁹ Ibid. The quoted text is “...做到‘两个维护,’矢志不渝做中国特色社会主义事业的建设者, 捍卫者. 政法机关要敢于刀刃向内, 刮骨疗毒, 坚决清除害群之马.”

⁴¹⁰ “Where the Significant Meaning of the ‘Two Upholds’ Comes From” (“两个维护”的重大意义从何而来) *Seeking Truth* (求是), 09 January 2021. “Full Text: Communique of 6th plenary session of 19th CPC Central Committee,” *Xinhua News Agency* posted on *PRC National People’s Congress* (Online), 11 November 2021. Xu Wei, “Upholding Core Position of Xi is Vital Requirement,” *China Daily*, 13 November 2021. “CPC Meeting Underlines Core Status of Xi,” *Xinhua News Agency*, 27 December 2018. James Palmer, “In Xi’s Little Red Article, the Monotony is the Point,” *Foreign Policy*, 17 July 2020.

⁴¹¹ The quoted phrase was 坚持底线思维着力防范化解重大风险. “Xi Jinping: Be on Guard against ‘Black Swan’ Incidents, Prevent ‘Grey Rhinos,’” (习近平：警惕“黑天鹅” 防范“灰犀牛”), *People’s Daily*, 22 January 2019.

⁴¹² “Xi Jinping: Be on Guard against ‘Black Swan’ Incidents, Prevent ‘Grey Rhinos,’” (习近平：警惕“黑天鹅” 防范“灰犀牛”), *People’s Daily*, 22 January 2019.

⁴¹³ Chris Buckley, “2019 is a Sensitive Year for China. Xi is Nervous,” *New York Times*, 25 February 2019.

⁴¹⁴ Ibid. Willy Wo-Lop Lam, “Xi Jinping Warns Against ‘Black Swans’ and ‘Grey Rhinos’ of a Possible Color Revolution,” *The Jamestown Foundation: China Brief* Volume 19, Issue 5, 05 March 2019, p. 6-9.

⁴¹⁵ The quoted text is “习近平在讲话中就防范化解政治, 意识形态, 经济, 科技, 社会, 外部环境, 党的建设等领域重大风险作出深刻分析, 提出明确要求. 他强调, 面对波谲云诡的国际形势, 复杂敏感的周边环境, 艰巨繁重的改革发展稳定任务, 我们必须始终保持高度警惕, 既要高度警惕“黑天鹅”事件, 也要防范“灰犀牛”事件; 既要有防范风险的先手, 也要有应对和化解风险挑战的高招; 既要打好防范和抵御风险的有准备之战, 也要打好化险为夷, 转危为机的战略主动战.” See, “Xi Jinping: Be on Guard against ‘Black Swan’ Incidents, Prevent ‘Grey Rhinos,’” (习近平：警惕“黑天鹅” 防范“灰犀牛”), the *People’s Daily*, 22 January 2019.

⁴¹⁶ “Daily Study of Key Terms: Be on Guard against ‘Black Swan’ Incidents, Prevent ‘Grey Rhinos,’” Extracted from *2020 Edition of Key Terms for Party Members and Cadres in the New Era* (新时代党员干部学习关键词 2020 版), Party Building Reading Material Publishing House (党建读物出版社), February 2020, reprinted on the Finance Bureau of the *Guiyang Municipal People’s Government* (Online), 15 October 2020.

⁴¹⁷ On April 19, 2016, Xi Jinping gave a speech on controlling the Internet in which he spoke of the “frequent appearance of black swans” in the context of a changing era. See, Shi Anbin (史安斌), “Xi Jinping ‘4/19 Speech’ Presents the ‘Chinese Plan’ for Global Internet Governance,” (习近平“4·19 讲话”呈现互联网全球治理的“中国方案”), the *People’s Daily Chinese Communist Party News*, 18 April 2017. On April 26, 2018, Xi gave a speech on energy and economic development in Wuhan in which he noted that mishandling black swan incidents and grey rhino incidents could have deleterious effects on China’s economy. “Xi Jinping: Speech at the Forum on Deeply Promote Development of the Changjiang River Delta Economic Belt” (习近平：在深入推动长江经济带发展座谈会上的讲话), *Seeking Truth* (求是) reprinted in *Xinhua*, 31 August 2019.

⁴¹⁸ “Xi Jinping: Be on Guard against ‘Black Swan’ Incidents, Prevent ‘Grey Rhinos,’” (习近平：警惕“黑天鹅” 防范“灰犀牛”), the *People’s Daily*, 22 January 2019.

⁴¹⁹ The Ministry of Science and Technology planned to establish around 700 state key laboratories nationwide by 2020. See, “By 2020 Our Country Will Have Established 700 State Key Laboratories,” (2020 年我国将建成 700 个国家重点实验室) *Xinhua News Agency*, 26 June 2018.

⁴²⁰ Profile of “Zhengli Shi,” *World Society for Virology* (Online), accessed 08 December 2021. Profile of “Editor-in-Chief: Zhengli Shi,” *Virologica Sinica* (Online), accessed 08 December 2021. Jasper Becker, *Made in China: Wuhan, Covid, and the Quest for Biotech Supremacy*, (London: C. Hurst & Co. Ltd., 2021), p. 168.

⁴²¹ Emphasis added. The quoted text is “习近平强调，科技领域安全是国家安全的重要组成部分。要加强体系建设和能力建设，完善国家创新体系，解决资源配置重复，科研力量分散，创新主体功能定位不清晰等突出问题，提高创新体系整体效能。要加快补短板，建立自主创新的制度机制优势。要加强重大创新领域战略研判和前瞻部署，抓紧布局国家实验室，重组国家重点实验室体系，建设重大创新基地和创新平台，完善产学研协同创新机制。要强化事关国家安全和经济社会发展全局的重大科技任务的统筹组织，强化国家战略科技力量建设。要加快科技安全预警监测体系建设，围绕人工智能，基因编辑，医疗诊断，自动驾驶，无人机，服务机器人等领域，加快推进相关立法工作。” See, “Xi Jinping: Be on Guard against ‘Black Swan’ Incidents, Prevent ‘Grey Rhinos,’” (习近平：警惕“黑天鹅” 防范“灰犀牛”), *People’s Daily*, 22 January 2019.

⁴²² “Wuhan Institute of Virology Convenes Study by the Party Committee’s Plenary Central Group and Special Investigation and Study Meeting of the Educational Theme ‘Never Forgetting our Original Aspiration and Keeping Firmly in Mind our Mission” (武汉病毒所召开党委扩大中心组学习暨“不忘初心，牢记使命”主题教育专题调研会议), *Wuhan Institute of Virology* (Online), 30 July 2019.

⁴²³ “Exchange and Discussion During the French Embassy in China and French Consulate General in Wuhan’s Visit to the Wuhan Institute of Virology” (法国驻华大使馆、法国驻武汉领事馆一行赴武汉病毒所交流座谈), *Wuhan Institute of Virology* (Online), 30 January 2019.

⁴²⁴ Ibid. His title in Chinese was “实验室质量控制专员。”

⁴²⁵ Jasper Becker, *Made in China: Wuhan, Covid, and the Quest for Biotech Supremacy*, (London: C. Hurst & Co. Ltd., 2021), p. 175.

⁴²⁶ The quoted text is “双方就新一届指导委员会的组织，中法双方病原资源共享以及 P4 实验室正压防护服出口等事项进行了深入交流与探讨。” See, “Exchange and Discussion During the French Embassy in China and French Consulate General in Wuhan’s Visit to the Wuhan Institute of Virology” (法国驻华大使馆、法国驻武汉领事馆一行赴武汉病毒所交流座谈), *Wuhan Institute of Virology* (Online), 30 January 2019.

⁴²⁷ Ibid. The quoted text is “法方表示将积极促进双方的交流，协助武汉 P4 实验室解决正压防护服短缺等问题。”

⁴²⁸ Jasper Becker, *Made in China: Wuhan, Covid, and the Quest for Biotech Supremacy*, (London: C. Hurst & Co. Ltd., 2021), p. 175.

⁴²⁹ Fangzhong Wang and Weiwen Zhang, “Synthetic Biology: Recent Progress, Biosafety and Biosecurity Concerns, and Possible Solutions,” *Journal of Biosafety and Biosecurity*, Volume 1, Issue 1, March 2019, p. 25. Note that this article was first published online on February 20 in advance of the March publication of the full journal.

⁴³⁰ Ibid. Emphasis added. Readers may recall that some virologists claimed in the early months of the pandemic that if SARS-CoV-2 was a chimera that had been engineered in a laboratory before escaping, such modifications to its genome would have been visible to virologists who examined its genomic structure. As illustrated by the Chinese experts quoted here, this claim was never true. There exists a “seamless” ligation method, that is a viral genome editing technique, which leaves no trace of artificial ligation, as the restriction sites do not remain in the final sequence after ligation. It was developed by Ralph Baric of the University of North Carolina Chapel Hill. See R.S. Baric and A.C. Sims, “Development of Mouse Hepatitis Virus and SARS CoV Infectious cDNA Constructs,” *Current Topics in Microbiology and Immunology* (2005), 287: 229-252.

⁴³¹ Emphasis added. Jinsong Li, et al., “Biosafety Laboratory Risk Assessment,” *Journal of Biosafety and Biosecurity* (Volume 1, Issue 2), September 2019, available online 20 February 2019, p. 91.

⁴³² UN Office for Disarmament Affairs, “New scientific and technological developments relevant to the Convention : background information document : addendum / submitted by the Implementation Support Unit,” Seventh Review Conference of the State Parties to the Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on Their Destruction, *United Nations Digital Library*, 23 November 2011, p. 3.

⁴³³ “Wuhan National Biosafety Level 3 Laboratory Obtains CNAS Accreditation Certificate,” (武汉国家生物安全 (三级) 实验室获得 CNAS 认可证书), *Wuhan Institute of Virology* (Online), 21 February 2019.

⁴³⁴ Ibid. Emphasis added. The quoted text is “2018 年 9 月 25-28 日, CNAS 组织专家对 P3 实验室进行了实验室资质的初次评审. 经过两天半的全面审查与测试, 通过文件审查, 现场考察, 人员考核等环节, 评审组一致认为该实验室硬件设施满足对三级病原的防护要求, 同时也对实验室在考察过程中发现的不符合项及观察项提出了具体整改要求. 经实验室全体工作人员的努力, 于 11 月底完成全部整改工作, 并于 12 月 1 日通过现场复核, 最终获得 CNAS 认可证书.”

⁴³⁵ The formal document number for the tender was ZB0109-201902-ZCFW0066. See, “Announcement of Call for Bids for Maintenance Project on the P3 Laboratory and Experimental Animal Center at the Zhengdian Campus of the Chinese Academy of Sciences Wuhan Institute of Virology” (中国科学院武汉病毒研究所郑店园区 P3 实验室及实验动物中心维保项目竞争性磋商公告), *Chinese Government Procurement Network* (中国政府采购网), 01 March 2019. Thanks to the DRASTIC Research Group for locating this document and archiving it. <https://archive.ph/7eCPU>

⁴³⁶ The document number was ZB0109-1903-ZCHW0248. See, “Announcement of Sole Source Procurement Order for Positive Pressure Protective Suits for the Chinese Academy of Sciences Wuhan Institute of Virology” (中国科学院武汉病毒研究所采购正压防护服项目单一来源公告), *Chinese Government Procurement Network* (中国政府采购网), 21 March 2019. Thanks to the DRASTIC Research Group for locating and archiving this document.

https://web.archive.org/web/20201112234607/http://www.ccg.gov.cn/cggg/dfgg/dylygg/201903/t20190321_11790067.htm

⁴³⁷ “The Origins of Covid-19: An Investigation of the Wuhan Institute of Virology,” *House Foreign Affairs Committee Report Minority Staff*, August 2021, pg. 17; Jasper Becker, *Made in China: Wuhan, Covid, and the Quest for Biotech Supremacy*, (London: C. Hurst & Co. Ltd., 2021), p. 172.

⁴³⁸ “Premier Li Keqiang Signs State Council Order announcing ‘the People’s Republic of China Human Hereditary Resources Management Regulations’” (李克强签署国务院令公布《中华人民共和国人类遗传资源管理条例》), *Xinhua News Agency* reprinted in the *PLA Daily*, 10 June 2019.

⁴³⁹ Ibid.

⁴⁴⁰ Tan Xueping (谭雪平) and Yang Yu (杨宇), “Genetic Warfare: the New Shadow Enveloping Humanity” (基因战争, 笼罩人类的新阴影), *PLA Daily*, 08 November 2018. Zhang Qiang (张强), “Genetic Weapons: a Pandora’s Box Worthy of Vigilance” (基因武器: 值得警惕的“潘多拉”魔盒), *Science and Technology Daily* reprinted in the *PLA Daily*, 06 November 2017.

⁴⁴¹ “Premier Li Keqiang Signs State Council Order announcing ‘the People’s Republic of China Human Hereditary Resources Management Regulations’” (李克强签署国务院令公布《中华人民共和国人类遗传资源管理条例》), *Xinhua News Agency* reprinted in the *PLA Daily*, 10 June 2019.

⁴⁴² Li Li (李莉), “Zhang Jiwen: Firmly Construct an Epidemic Inspection Line of Defense at Ports of Entry and Strictly Maintain Biosecurity at the Nation’s Gates” (张际文: 筑牢口岸检疫防线 严守国门生物安全), *Sohu.com*, 28 March 2019.

⁴⁴³ George Fu Gao, “For a Better World: Biosafety Strategies to Protect Global Health,” *Biosafety and Health* 1 (1) (2019), p. 1. Note that this article was first submitted on February 25, accepted on March 17, and first appeared online on March 25. The hard copy version of the journal was not published until June 2019.

⁴⁴⁴ “Event 201 Players: George Fu Gao,” *Johns Hopkins Center for Health Security* (Online), accessed on 15 December 2021.

⁴⁴⁵ Emphasis added. George Fu Gao, “For a Better World: Biosafety Strategies to Protect Global Health,” *Biosafety and Health* 1 (1) (2019), p. 2.

⁴⁴⁶ UN Office for Disarmament Affairs, “New scientific and technological developments relevant to the Convention : background information document : addendum / submitted by the Implementation Support Unit,” Seventh Review Conference of the State Parties to the Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on Their Destruction, *United Nations Digital Library*, 23 November 2011, p. 2.

⁴⁴⁷ Ibid, p. 3.

⁴⁴⁸ Ibid, p. 2.

⁴⁴⁹ Zhu Ningning (朱宁宁), "Six Legislative Items will Complete Interim Goals This Year" (6个立法项目将于今年完成阶段性目标), *The Legal Daily* reprinted on the *National People's Congress* (Online), 02 April 2019.

⁴⁵⁰ Changhao Wei, "NPCSC Session Watch: Encryption, Civil Code, Biosecurity, Child Protection & State Supervision Commission Rulemaking," *NPC Observer* (Online), 15 October 2019.

⁴⁵¹ The quoted text is "近年来,媒体报道了我国在生物安全问题上的一些事件,引起国际,国内高度关注." Zhu Ningning (朱宁宁), "Six Legislative Items will Complete Interim Goals This Year" (6个立法项目将于今年完成阶段性目标), *The Legal Daily* reprinted on the *National People's Congress* (Online), 02 April 2019.

⁴⁵² The quoted text is "要以立法高质量发展保障和促进经济持续健康发展." See, "Xi Jinping Chairs the Opening of the Second Meeting of the Central Committee's Commission on the Comprehensive Use of the Law to Rule the Country" (习近平主持召开中央全面依法治国委员会第二次会议), *Xinhua News Agency* re-posted on the *PLA Daily*, 25 February 2019.

⁴⁵³ "Wuhan Institute of Virology Convenes 2019 Security Work Conference" (武汉病毒所召开 2019 年度安全工作会议), *Wuhan Institute of Virology* (Online), 08 April 2019.

⁴⁵⁴ Ibid. The quoted text is "何长才指出, 今年是新中国成立 70 周年和中科院建院 70 周年... 做好安全生产工作至关重要. 要从讲政治的高度把握安全生产, 要巩固树立安全发展观念, 着眼践行 '两个维护' 来看待安全生产... 时刻绷紧安全生产这根弦, 警钟长鸣, 常抓不懈, 努力为科技创新与发展营造良好环境."

⁴⁵⁵ "Extremely accurate and detailed report" is "非常详实的报告," while "political inspection tour" is "政治巡视." See, "Wuhan Institute of Virology Convenes Work Meeting for Political Inspection Tour," (武汉病毒所召开政治巡视工作宣讲会), *Wuhan Institute of Virology* (Online), 04 April 2019.

⁴⁵⁶ The quoted text is "他强调, 要严格落实 '党政同责, 一岗双责, 齐抓共管, 失职追责' 的安全管理责任制要求, 坚持 '管业务必须管安全, 管生产必须管安全', 必须使两方面工作齐头并进." See, "Wuhan Institute of Virology Convenes 2019 Security Work Conference" (武汉病毒所召开 2019 年度安全工作会议), *Wuhan Institute of Virology* (Online), 08 April 2019.

⁴⁵⁷ Ibid. The quoted text is "要严格遵守国家, 中科院和研究所各项安全管理法律, 法规及法章制度, 加强日常安全管理, 不定期开展安全自查与隐患整改..."

⁴⁵⁸ Ibid. The quoted text is "研究所安全工作是研究所做好所有工作的前提和保障."

⁴⁵⁹ Ibid. The quoted text is "她要求: 一是要严格落实安全工作责任制, 将安全管理工作与科研业务工作紧密结合, 做到两者 '同计划, 同部署, 同检查, 同总结, 同评比'; 二是实验室的各项操作必须严格遵照标准作业程序执行, 不可存在任何侥幸心理; 三是进一步加强学生安全管理."

⁴⁶⁰ Ibid. The quoted text is "安全工作无小事, 要时刻绷紧安全生产这根弦, 做到规定动作不遗漏, 发现问题及时整改到位."

⁴⁶¹ "Wuhan Institute of Virology and Wuhan Municipal Jinyintan Hospital Sign Research Cooperation Agreement," (武汉病毒所与武汉市金银潭医院签署合作研究协议), *Wuhan Institute of Virology* (Online), 25 April 2019.

⁴⁶² Ibid.

⁴⁶³ Patrick Fok, "A Year After Virus Appeared, Wuhan Tells China's Pandemic Story," *PBS Newshour*, 17 November 2020; "WHO Team Visits Wuhan Hospital that Took in First COVID-19 Patients," *Agence France-Presse*, 30 January 2021.

⁴⁶⁴ The term "investigate and study" is "调研," and "on-the-spot inspections" is "实地检查." See, "Wang Shuzhi Investigates and Studies the Wuhan Institute of Virology's Security Work," (王树志调研武汉病毒所安全保卫工作), *Wuhan Institute of Virology* (Online), 07 May 2019.

⁴⁶⁵ Ibid. The quoted text is "重点讨论了郑店科研园区安防设施升级方案."

⁴⁶⁶ Ibid. The first quote is "王树志肯定了武汉病毒所安保工作成效, 并对升级方案提出了改进意见," and the second quote is "他要求武汉病毒所要建立健全安防管理体系, 完善安保工作机制..."

⁴⁶⁷ "Wuhan Institute of Virology Convenes 'May 4' Youth Conference and Young Cadres Special Training," (武汉病毒所召开 "五四" 青年大会暨年轻干部专题培训会议), *Wuhan Institute of Virology* (Online), 30 April 2019.

⁴⁶⁸ Ibid. The first quote is "锐利思想武器," and the second quote is "要在党的领导下, 立足国家需求, 开展科研工作, 做时代的奋进者和搏击者."

⁴⁶⁹ Ibid. The quoted text is “中科院作为党, 国家, 人民可以依靠, 可以信赖的国家战略科技力量, 承载了将我国建设成为世界科技强国的使命, 对于科学院青年来说, 既生逢其时, 也重任在肩。”

⁴⁷⁰ “Nationwide Sanitation and Health System’s Safe Production Work Video Conference Convened” (全国卫生健康系统安全生产工作视频会议召开), *National Health Commission of the People’s Republic of China* (Online), 15 May 2019.

⁴⁷¹ Ibid. The quoted text is “确保不发生重特大安全事故。”

⁴⁷² Ibid. The quoted text is “做好高等级生物安全实验活动监管和高级别病原微生物菌种管理。”

⁴⁷³ Eva Dou, “Wuhan Lab’s Classified Work Complicates Search for Pandemic’s Origins,” *Washington Post*, 22 June 2021. Ryan Clarke and Lam Peng Er, “Coronavirus Research in China: Origins, International Networks, and Consequences,” Non-Traditional Security (NTS)-Asia Consortium, Nanyang Technological University Singapore, 20 May 2021, p. 14.

⁴⁷⁴ Eva Dou, “Wuhan Lab’s Classified Work Complicates Search for Pandemic’s Origins,” *Washington Post*, 22 June 2021. Note that Senator Rubio’s staff independently examined the original CAS report upon which the Washington Post’s reporting was based.

⁴⁷⁵ See, “Wuhan Institute of Virology Holds 2019 Specialized Training on National Security” (武汉病毒所举办 2019 年国家专题培训), *Wuhan Institute of Virology* (Online), 13 May 2019.

⁴⁷⁶ Ibid. The quoted text is “针对手机使用存在的安全隐患, 提出详细的防范措施。”

⁴⁷⁷ Ibid. The quoted text is “他指出, 随着我国综合国力的不断提升, 信息化的高速发展, 大数据, 云计算, 人工智能等技术的持续推进, 境外间谍情报机关对我国情报渗透活动愈发活跃, 安全保密形式更加复杂和严峻, 因此, 我们要牢固树立 ‘总体国家安全观’ 进一步加强对网路, 手机等新兴领域的安全保密防范意识, 掌握基本知识和技能, 从而提高反奸防谍和安全保密防护能力。”

⁴⁷⁸ See, “Wuhan Institute of Virology Party Branch Launches Party Day Activity on the Theme of ‘National Security Education’,” (武汉病毒所机关党支部开展 “国家安全教育” 主题党日活动), *Wuhan Institute of Virology* (Online), 29 April 2019; “Wuhan Institute of Virology Launches Educational Activities for 2019 New Students Matriculating to the Institute” (武汉病毒所开展 2019 级新生入所教育活动), *Wuhan Institute of Virology* (Online), 05 September 2019.

⁴⁷⁹ Yuan Zhiming, “Current Status and Future Challenges of High-Level Biosafety Laboratories in China,” *Journal of Biosafety and Biosecurity*, Volume 1, Issue 2, September 2019, p. 125.

⁴⁸⁰ Ibid, p. 125-126.

⁴⁸¹ Ibid, p. 125.

⁴⁸² Ibid, p. 123.

⁴⁸³ “Hou Jianguo Visits Wuhan Branch [of CAS] to Investigate and Study Their Work on Party Building and Cadre Talen,” (侯建国赴武汉分院调研党建和干部人才工作), the *Chinese Academy of Sciences* reposted on the *Wuhan Institute of Virology* (Online), 31 May 2019.

⁴⁸⁴ Ibid. The quoted text is “侯建国强调, 要以习近平新时代中国特色社会主义思想为指导, 增强 “四个意识,” 坚定 “四个自信,” 坚决做到 “两个维护,” 始终在政治立场, 政治方向, 政治原则, 政治道路上与以习近平同志为核心的党中央保持高度一致。”

⁴⁸⁵ Ibid. The quoted text is “力戒形式主义, 官僚主义。”

⁴⁸⁶ “PCR Purchasing Report Wuhan China,” Internet 2.0 Relentless Security, October 2021, p. 10.

⁴⁸⁷ Minnie Chan, “Coronavirus: Chinese Military Takes Control of Medical Supplies in Wuhan,” *South China Morning Post*, 03 February 2020.

⁴⁸⁸ Jamie Tarabay, “Bloomberg Government: China PCR Purchases Increased Before First Known Covid Cases,” *Bloomberg Government*, 04 October 2021. Masaya Kato, “China PCR test orders soared before first confirmed COVID case,” *Nikkei Asia*, 05 October 2021.

⁴⁸⁹ The quoted text is “实现了党建与业务工作的有机融合, 做到了党建工作全覆盖, 无死角。” See “Xiang Shuilun Examines the Wuhan Institute of Virology’s Work of Establishing a ‘Red Flag Party Branch’” (项水伦考核武汉病毒所 “红旗党支部” 创建工作), *Wuhan Institute of Virology* (Online), 11 June 2019.

⁴⁹⁰ The quoted text is “武汉病毒所作为国家科研院所, 其初心和使命就是 ‘创新科技, 服务国家, 福祉人民’, 要通过这次主题教育自觉对标国家对科技创新工作提出的要求...” See “Wuhan Institute of Virology Convened Promotion Meeting for Work on the Educational Theme of ‘Staying True to our Original Aspiration, Keeping Firmly in

Mind our Mission' and a Study Session of the Expanded Party Committee Central Group" (武汉病毒所召开 "不忘初心, 牢记使命" 主题教育工作推进会暨党委中心组 (扩大) 学习会议), *Wuhan Institute of Virology* (Online), 21 June 2019.

⁴⁹¹ "Wuhan Institute of Virology Convenes Special Investigation and Study Meeting on the Educational Theme of 'Staying True to our Original Aspiration, Keeping Firmly in Mind our Mission'" (武汉病毒所召开 "不忘初心, 牢记使命" 主题教育专题调研会), *Wuhan Institute of Virology* (Online), 11 July 2019. The quoted text is "肖庚富强调, 研究中心负责人要在工作中发挥带头表率作用, 提高政治站位, 牢记 '创新科技. 服务国家, 造福人民' 的初心和 '建设世界科技强国' 的使命."

⁴⁹² The key phrase is "不忘初心, 牢记使命." See, "Wuhan Institute of Virology Convenes Centralized Study Session on the Educational Theme of 'Staying True to our Original Aspiration, Keeping Firmly in Mind our Mission'" (武汉病毒所召开 '不忘初心, 牢记使命' 主题教育集中学习班), *Wuhan Institute of Virology* (Online), 25 June 2019.

⁴⁹³ Ibid. The quoted text is "形式主义, 官僚主义是目前党内存在的突出矛盾和问题."

⁴⁹⁴ For an authoritative discussion of the two terms in question (形式主义 and 官僚主义), including explanatory comments from Xi Jinping, see "What is Formalism? Bureaucratism? Do you Really Understand?" (什么是形式主义? 官僚主义? 你真的了解吗?), *The People's Daily*, 07 May 2020. For an academic analysis of "formalism," see Roy Chan, "Formalism," in *Afterlives of Chinese Communism*, Christian Sorace, et. al., eds., Australian National University Press: Canberra, 2019, pg. 77-80.

⁴⁹⁵ The quoted text is "目前, 生物安全大科学中心的筹建工作处于关键时期, 这不仅需要广大管理人员不断提升眼界, 素养和能力, 做到担起责任, 带好队伍, 落实工作, 还需要各部门之间的充分协调, 从而更好地为科技创新工作保驾护航." "Wuhan Institute of Virology Convenes Centralized Study Session on the Educational Theme of 'Staying True to our Original Aspiration, Keeping Firmly in Mind our Mission'" (武汉病毒所召开 '不忘初心, 牢记使命' 主题教育集中学习班), *Wuhan Institute of Virology* (Online), 25 June 2019.

⁴⁹⁶ The quoted text is "坚持强脑铸魂, 着力提升党员干部思想政治素质...始终坚持建强战斗堡垒." See, "Wuhan Institute of Virology's Zhengdian Laboratory Party Branch is Awarded with Honorary Title of 'Red Flag Party Branch' from Hubei Provincial Work Committee for Directly Subordinate Organizations" (武汉病毒所郑店实验室党支部荣获湖北省直机关工委 "红旗党支部" 荣誉称号), *Wuhan Institute of Virology* (Online), 01 July 2019.

⁴⁹⁷ "Wuhan Institute of Virology Convenes General Assembly to Honor and Celebrate 98th Anniversary of the Founding of the Party and Party Lecture Report on the Educational Theme of 'Staying True to our Original Aspiration, Keeping Firmly in Mind our Mission'," (武汉病毒所召开庆祝建党 98 周年表彰大会暨 "不忘初心, 牢记使命" 主题教育党课报告会), *Wuhan Institute of Virology* (Online), 01 July 2019.

⁴⁹⁸ Ibid. The quoted text is "重温入党誓词" and "20 位同志荣获武汉病毒所 '2019 年度优秀共产党员' 称号."

⁴⁹⁹ See "Wuhan Institute of Virology Organizes Centralized Study on the Educational Theme of 'Staying True to our Original Aspiration, Keeping Firmly in Mind our Mission'," (武汉病毒所组织 "不忘初心, 牢记使命" 主题教育集中学习), *Wuhan Institute of Virology* (Online), 09 July 2019; and "Wuhan Institute of Virology Convenes Meeting to Promote [Political] Theory Study Work Among Young Cadres and Specialized Investigation and Study of the Educational Theme of 'Staying True to our Original Aspiration, Keeping Firmly in Mind our Mission'" (武汉病毒研究所召开年轻干部理论学习工作推进会暨 "不忘初心, 牢记使命" 主题教育专题调研会), *Wuhan Institute of Virology* (Online), 16 July 2019; and "The Party Branch of the Wuhan Institute of Virology Molecular Virus and Pathogen Research Center Organizes Monthly Party Day Activities and Specialized Investigation and Study of 'Staying True to our Original Aspiration, Keeping Firmly in Mind our Mission'" (武汉病毒所分子病毒与病理研究中心党支部组织 "不忘初心, 牢记使命" 主题党日活动暨专题调研会), *Wuhan Institute of Virology* (Online), 19 July 2019; and "Wuhan Institute of Virology Convenes Specialized Investigation and Study Meeting for Educational Theme of 'Staying True to our Original Aspiration, Keeping Firmly in Mind our Mission'" (武汉病毒所召开 "不忘初心, 牢记使命" 主题教育专题调研会), *Wuhan Institute of Virology* (Online), 19 July 2019; and "Wuhan Institute of Virology Organizes Centralized Study on the Educational Theme of 'Staying True to our Original Aspiration, Keeping Firmly in Mind our Mission'" (武汉病毒所组织 "不忘初心, 牢记使命" 主题教育集中学习), *Wuhan Institute of Virology* (Online), 19 July 2019; and "Party Branch of the Wuhan Institute of Virology Organizes Monthly Party Day Activities and Specialized Investigation and Study of 'Staying True to our Original Aspiration, Keeping

Firmly in Mind our Mission” (武汉病毒所微生物资源与生物信息研究中心党支部组织 “不忘初心，牢记使命” 主题党日活动暨主题教育专题调研会), *Wuhan Institute of Virology* (Online), 22 July 2019; and “Wuhan Institute of Virology Supporting Party Branch Organizes Monthly Party Day Activities and Specialized Investigation and Study of ‘Staying True to our Original Aspiration, Keeping Firmly in Mind our Mission’” (武汉病毒所支撑党支部组织 “不忘初心，牢记使命” 主题党日活动暨专题调研会), *Wuhan Institute of Virology* (Online), 22 July 2019; and “Wuhan Institute of Virology Convenes Study by the Party Committee’s Plenary Central Group and Special Investigation and Study Meeting of the Educational Theme ‘Staying True to our Original Aspiration and Keeping Firmly in Mind our Mission’” (武汉病毒所召开党委扩大中心组学习暨 “不忘初心，牢记使命” 主题教育专题调研会议), *Wuhan Institute of Virology* (Online), 30 July 2019; and “Wuhan Institute of Virology Organizes Training Session for the Work of Party Branches” (武汉病毒所组织党支部工作培训会议), *Wuhan Institute of Virology* (Online), 30 July 2019.

⁵⁰⁰ See, “Wuhan Institute of Virology Convenes Discussion Session for Results of Investigation and Study of the Educational Theme ‘Staying True to our Original Mission, Keeping Firmly in Mind our Mission’” (武汉病毒所召开 “不忘初心，牢记使命” 主题教育调研成果座谈会), *Wuhan Institute of Virology* (Online), 05 August 2019.

⁵⁰¹ The quoted text is “积极地投身到中科院的 ‘三个面向’，‘四个率先’ 工作中。” “Wuhan Institute of Virology Convenes General Assembly to Honor and Celebrate 98th Anniversary of the Founding of the Party and Party Lecture Report on the Educational Theme of ‘Staying True to our Original Aspiration, Keeping Firmly in Mind our Mission’,” (武汉病毒所召开庆祝建党 98 周年表彰大会暨 “不忘初心，牢记使命” 主题教育党课报告会), *Wuhan Institute of Virology* (Online), 01 July 2019.

⁵⁰² The quoted text is “ ‘三个面向’ ：面向世界科技前沿，面向国家重大需求，面向国民经济主战场。” Ding Jia (丁佳), “Chinese Academy of Sciences Issues New Guiding Principles for its Offices and the Academy: Three Orientations, Four Firsts” (中科院发布办院新方针：三个面向 四个率先), *Science Net.cn*, 13 February 2015.

⁵⁰³ The quoted text is “贯彻习近平总书记 ‘三个面向’ ‘四个率先’ 重要指示批示精神尚有差距。” “Central Committee No. 15 Patrol Inspection Group Gives Feedback on Inspection Situation to Chinese Academy of Sciences Party Organization” (中央第十五巡视组向中国科学院党组反馈巡视情况), *CCP Central Commission on Discipline Inspection* (Online), 10 January 2020.

⁵⁰⁴ The goal of the Belt and Road Initiative (BRI) is to build global infrastructure and capacity, which includes technical exchanges led by institutions like the WIV, with the ultimate goal of creating interconnectivity and international dependency on China for investment, commerce, trade, and science and technology. For more on BRI, see Andrew Chatzky and James McBride, “China’s Massive Belt and Road Initiative,” *Council on Foreign Relations*, 28 January 2020. For examples of the WIV’s involvement, see “Researcher Yang Rongge Leads a Visiting Exchange Delegation to the Philippines” (杨荣阁研究员率团赴菲律宾交流访问), *Wuhan Institute of Virology* (Online), 10 June 2019; and “Wuhan Institute of Virology Organizes Centralized Study of Educational Theme of ‘Staying True to our Original Aspiration, Keeping Firmly in Mind our Mission’” (武汉病毒所组织 “不忘初心，牢记使命” 主题教育集中学习), *Wuhan Institute of Virology* (Online), 11 July 2019; and “Wuhan Institute of Virology Convenes Discussion Session for Results of Investigation and Study of the Educational Theme ‘Staying True to our Original Mission, Keeping Firmly in Mind our Mission’” (武汉病毒所召开 “不忘初心，牢记使命” 主题教育调研成果座谈会), *Wuhan Institute of Virology* (Online), 05 August 2019.

⁵⁰⁵ The quoted text is “针对进口关键核心设备可能出现的 “卡脖子” 问题，组织专业小组进行技术攻关及国产化替代产品的采购和研发...” See “Xiang Shuilun Examines the Wuhan Institute of Virology’s Work of Establishing a ‘Red Flag Party Branch’” (项水伦考核武汉病毒所 “红旗党支部” 创建工作), *Wuhan Institute of Virology* (Online), 11 June 2019.

⁵⁰⁶ Emphasis added. The quoted text is “聚焦生物安全领域 ‘卡脖子’ 问题，提出解决方案，通过攻坚克难，切实推进生物安全大科学中心的建设与发展，助力国家科技发展。” See “Wuhan Institute of Virology Convenes Promotion Meeting for Work on the Educational Theme of ‘Staying True to our Original Aspiration, Keeping Firmly in Mind our Mission’ and a Study Session of the Expanded Party Committee Central Group” (武汉病毒所召开 “不忘初心，牢记使命” 主题教育工作推进会暨党委中心组 (扩大) 学习会议), *Wuhan Institute of Virology* (Online), 21 June 2019.

⁵⁰⁷ The quoted text is “围绕‘卡脖子’的技术问题,开展关键核心设备的管理交流与自主研发。” See “Wuhan Institute of Virology’s Zhengdian Laboratory Party Branch is Awarded with Honorary Title of ‘Red Flag Party Branch’ from Hubei Provincial Work Committee for Directly Subordinate Organizations” (武汉病毒所郑店实验室党支部荣获湖北省直机关工委“红旗党支部”荣誉称号), *Wuhan Institute of Virology* (Online), 01 July 2019.

⁵⁰⁸ “Wuhan Institute of Virology and the Guangzhou Municipal No. 8 People’s Hospital Sign Strategic Cooperation Agreement,” (武汉病毒所与广州市第八人民医院签署战略合作协议), *Wuhan Institute of Virology* (Online), 01 July 2019.

⁵⁰⁹ Ibid. The quoted text is “新发, 突发传染性病和重大传染性病关系到人民健康, 社会稳定和国家安全, 武汉病毒所与广州市第八人民医院各自在传染病的基础研究和临床治疗方面具有优势和特色, 双方未来将以战略合作协议的签署为新起点开展全面合作, 共同为我国新发突发和重大传染性病的防控工作做出重要贡献。”

⁵¹⁰ See “Vaccine Administration Law of the People’s Republic of China,” *The National People’s Congress of the People’s Republic of China* (Online), 29 June 2019.

⁵¹¹ Jiao Feng and Qin Li, “How to Ensure Vaccine Safety: An Evaluation of China’s Vaccine Regulation System,” *Vaccine Journal*, 39(37):5285-5294, 31 August 2021.

⁵¹² Ibid. See also Wang Chen (王晨), “To Provide a Legal Protection for the People’s Physical Health: Writing at the Time of the Passage of the People’s Republic of China Vaccine Administration Law” (为人民群众身体健康提供有力法制保障: 写在中华人民共和国疫苗管理法通过之际), *The People’s Congress of China Magazine* (中国人大), No. 15, Vol. 483, 05 August 2019, pg.11.

⁵¹³ “The Unfolding of China’s Changsheng Vaccine Scandal,” *Reuters*, 24 July 2018.

⁵¹⁴ Karen Pauls, “Chinese Researcher Escorted from Infectious Disease Lab amid RCMP Investigation,” *CBC News*, 14 July 2019.

⁵¹⁵ Karen Pauls, “Scientists Let Go From National Microbiology Laboratory amid RCMP Investigation,” *CBC News*, 06 February 2021.

⁵¹⁶ Karen Pauls, “‘Wake-up Call for Canada’: Security Analysts say Case of 2 Fired Scientists Could Point to Espionage,” *CBC News*, 10 June 2021.

⁵¹⁷ Ibid.

⁵¹⁸ Karen Pauls, “Canadian Scientist Sent Deadly Viruses to Wuhan Lab Months before RCMP Asked to Investigate,” *CBC News*, 14 June 2020.

⁵¹⁹ Karen Pauls, “Canadian Government Scientist under Investigation Trained Staff at Level 4 lab in China,” *CBC News*, 03 October 2019.

⁵²⁰ For example, Qiu and her husband Cheng participated in a 2018 study in which 14 of their 20 coauthors worked for the PLA, mostly at the AMMS. See, Wang H, Wong G, Zhu W, He S, Zhao Y, Yan F, Rahim MN, Bi Y, Zhang Z, Cheng K, Jin H, Cao Z, Zheng X, Gai W, Bai J, Chen W, Zou Y, Gao Y, Gao GF, Yang S, Xia X, Qiu X, “Equine-origin immunoglobulin fragments protect nonhuman primates from Ebola virus disease,” *Journal of Virology*, 93: e01548-18, submitted 05 September 2018, published 19 February 2019.

⁵²¹ “Wuhan Institute of Virology Organizes Centralized Study on the Educational Theme of ‘Staying True to our Original Aspiration, Keeping Firmly in Mind our Mission’,” (武汉病毒所组织“不忘初心, 牢记使命”主题教育集中学习), *Wuhan Institute of Virology* (Online), 09 July 2019. The quoted text from Xi is “习近平总书记强调我们既要善于补齐短板, 更要注重加固底板。” The second quote is “重点针对目前 P4 实验室在建设和运维过程中存在的短板和底板问题展开热烈讨论。”

⁵²² Ibid. The quoted text is “党员领导干部成员通过深入调研和广泛征求意见, 充分了解和认识到限制研究所发展的短板和底板, 并提出有针对性和可操作性的解决措施。”

⁵²³ Ibid. Emphasis added. The quoted text is “研究所生物安全大科学研究中心的建设, 不仅需要科研人员自身增强忧患意识, 时刻防控风险, 也需要科研支撑部门的管理人员在工作上进一步提质增效, 切实服务研究所的科技创新发展。”

⁵²⁴ “Li Zhanshu: Use the Law to Delimit the Boundaries of the Development of Biotechnology, Ensure and Accelerate the Healthy Development of Biotechnology” (栗战书: 用法律划定生物技术发展边界 保障和促进生物技术健康发展), *Xinhua reprinted on the PRC National People’s Congress* (Online), 11 July 2019.

⁵²⁵ Ibid. The quoted text is “增强忧患意识, 做到居安思危。”

⁵²⁶ Ibid. Emphasis added. The quoted text is “以习近平同志为核心的党中央高度重视生物安全问题, 习近平总书记多次作出重要指示, 为生物安全立法工作指明了方向, 提供了遵循. 要深入贯彻习近平总书记重要指示要求, 坚持从总体国家安全观的高度充分认识生物安全立法的必要性和紧迫性, 通过立法确立生物安全领域的基础性制度原则, 突出风险防范, 用法律武器保卫国家生物安全, 保障人民生命健康.”

⁵²⁷ Ibid. The quoted text is “要通过立法, 引导和规范人类生物技术的研​​究应用走正确之路, 促进生物技术快速健康发展, 防止和减少可能出现的危害和损失.”

⁵²⁸ “Wuhan Institute of Virology Convenes a Promotion Meeting for Young Cadres’ Theoretical Studies and a Special Study Meeting on the Theme of ‘Staying True to Our Original Aspiration, Keeping Firmly in Mind Our Mission’,” (武汉病毒所召开年轻干部理论学习工作推进会暨 “不忘初心、牢记使命” 主题教育专题调​​研会), *Wuhan Institute of Virology* (Online), 16 July 2019.

⁵²⁹ Ibid. The quoted text is “青年管理人员要在工作中坚持问题导向, 围绕研究所中心工作, 为科研服务解难题, 找到影响研究所管理中存在的突出问题, 并正视问题, 解决问题.”

⁵³⁰ See, “Announcement of Deal Reached for Project to Renovate the Hazardous Waste Management System at the Zhengdian Campus of the Chinese Academy of Sciences Wuhan Institute of Virology” (中国科学院武汉病毒研究所郑店园区危废处理系统改造工程成交公告), *Chinese Government Procurement Network* (中国政府采购网), 31 July 2019. Thanks to the DRASTIC Research Group for locating this document and archiving it.

<https://archive.ph/3CW03#selection-149.0-152.0>

⁵³¹ Ibid.

⁵³² See, “Wang Shuzhi Investigates and Studies the Wuhan Institute of Virology’s Security Work,” (王树志调研武汉病毒所安全保卫工作), *Wuhan Institute of Virology* (Online), 07 May 2019.

⁵³³ The quoted text is “参会党员针对生物安全理论和技术培训, 安全隐患的筛查和管理制度的完善, 高精端仪器的共享及郑店实验室整体搬迁等方面提出了意见和建议.” “Party Branch of the Wuhan Institute of Virology Microbiological Resources and Bioinformatics Research Center Organizes Monthly Party Day Activities and Specialized Investigation and Study of ‘Staying True to our Original Aspiration, Keeping Firmly in Mind our Mission’” (武汉病毒所微生物资源与生物信息研究中心党支部组织 “不忘初心, 牢记使命” 主题党日活动暨主题教育专题调​​研会), *Wuhan Institute of Virology* (Online), 22 July 2019.

⁵³⁴ The quoted text is “强化责任担当意识, 敢于承担责任, 敢于向困难挑战, 善于在工作中磨练自己, 积累经验, 提升自己, 收获成长.” “Wuhan Institute of Virology Convenes Specialized Investigation and Study Meeting for Educational Theme of ‘Staying True to our Original Aspiration, Keeping Firmly in Mind our Mission’” (武汉病毒所召开 “不忘初心, 牢记使命” 主题教育专题调​​研会), *Wuhan Institute of Virology* (Online), 19 July 2019.

⁵³⁵ The quoted text is “中层管理干部要注重个人能力的提升, 尤其要重视学习, 学有所悟, 学有所得, 用学习指导工作, 用学习推动工作。在工作中, 要有 “咬定青山不放松” 的干事毅力, 要善于科学思维, 以问题为导向, 抓住关键问题, 充分发扬钉钉子精神, 做到有始有终, 把问题抓实, 再抓实, 不留下遗留问题, 真正让工作有成效.” See, “Wuhan Institute of Virology Organizes Centralized Study on the Educational Theme of ‘Staying True to our Original Aspiration, Keeping Firmly in Mind our Mission’” (武汉病毒所组织 “不忘初心, 牢记使命” 主题教育集中学习), *Wuhan Institute of Virology* (Online), 19 July 2019.

⁵³⁶ The official project tender number was OITC-G190330973. See, “Procurement Project Open Announcement for Bids on Ambient Air Disinfection Treatment System and Scalable Automated Sample Storage Management System for the Chinese Academy of Sciences Wuhan Institute of Virology” (中国科学院武汉病毒研究所环境空气消毒处理系统、可拓展型自动化样品存储管理系统采购项目公开招标公告), *Chinese Government Procurement Network* (中国政府采购网), 18 July 2019. Thanks to the DRASTIC Research Group for locating this document and archiving it. <https://archive.ph/1qeVp#selection-149.0-149.48>

⁵³⁷ See, “Keep Firmly in Mind Your Responsibilities, Hold Fast to the Mission, Be a Pioneer for our Nation in the Realm of High-Level Biosafety – The Achievements of the Zhengdian Lab Party Branch of the Chinese Academy of Sciences Wuhan Institute of Virology (牢记责任, 坚守使命 做我国高等级生物安全领域的开拓者——中科院武汉病毒所郑店实验室党支部事迹), *Wuhan Institute of Virology* (Online), 12 November 2019; and “Wuhan Institute of Virology Holds 2019 Training Class on Biosafety Laboratory Management and Techniques for Conducting Experiments” (武汉病毒所举办 2019 年生物安全实验室管理与实验技术培训班), *Wuhan Institute of Virology* (Online), 28 November 2019.

⁵³⁸ “Announcement of the Winning Bid for the Procurement Project for an Ambient Air Disinfection Treatment System and Scalable Automated Sample Storage Management System for the Chinese Academy of Sciences Wuhan Institute of Virology” (中国科学院武汉病毒研究所环境空气消毒处理系统、可拓展型自动化样品存储管理系统采购项目中标公告), *Chinese Government Procurement Network* (中国政府采购网), 14 August 2019. Thanks to the DRASTIC Research Group for locating this document and archiving it. <https://archive.ph/1nXLD#selection-149.0-152.0>

⁵³⁹ See, “Wang Shuzhi Investigates and Studies the Wuhan Institute of Virology’s Security Work,” (王树志调研武汉病毒所安全保卫工作), *Wuhan Institute of Virology* (Online), 07 May 2019.

⁵⁴⁰ “Wuhan Institute of Virology and the Hubei International Travel Healthcare Center Sign Comprehensive Cooperation Agreement” (武汉病毒所与湖北国旅保健中心签署全面合作协议), *Wuhan Institute of Virology* (Online), 28 July 2019.

⁵⁴¹ For information on the relationship between the International Travel Healthcare Center and the General Administration of Customs, see the official website of the General Administration for Customs (Beijing) International Travel Healthcare Center at <https://www.beijingithc.org.cn/>

⁵⁴² “Wuhan Institute of Virology and the Hubei International Travel Healthcare Center Sign Comprehensive Cooperation Agreement” (武汉病毒所与湖北国旅保健中心签署全面合作协议), *Wuhan Institute of Virology* (Online), 28 July 2019.

⁵⁴³ “Wuhan Institute of Virology Signs Strategic Cooperation Agreement with the Wuhan Customs Administration” (武汉病毒所与武汉海关签署战略合作协议), *Wuhan Institute of Virology* (Online), 01 July 2019.

⁵⁴⁴ The quoted text is “2019 年武汉军运会期间生物安全检测保障.” “Wuhan Institute of Virology and the Hubei International Travel Healthcare Center Sign Comprehensive Cooperation Agreement” (武汉病毒所与湖北国旅保健中心签署全面合作协议), *Wuhan Institute of Virology* (Online), 28 July 2019.

⁵⁴⁵ Ibid. The quoted text is “根据全面合作协议，武汉病毒所与湖北国旅保健中心将重点围绕口岸新发烈性传染病检测，口岸生物样本库建设，病原研究及检测新技术研发等领域开展合作，共同为我国的新发烈性传染病防控做出贡献。”

⁵⁴⁶ “National Health Commission Holds 2019 National Sudden Public Health Incident Emergency Drill” (国家卫健委举办 2019 年国家突发公共卫生事件应急演练), *Xinhua News Agency*, 25 July 2019. Xu Wen (许雯), “Largest Scale Emergency Response Drill Staged in the Post-SARS Era” (后 SARS 时代，上演最大规模应急演练), *The Beijing News* reposted on the *Chinese Center for Disease Control and Prevention* (Online), 05 August 2019.

⁵⁴⁷ “National Health Commission Holds 2019 National Sudden Public Health Incident Emergency Drill” (国家卫健委举办 2019 年国家突发公共卫生事件应急演练), *Xinhua News Agency*, 25 July 2019.

⁵⁴⁸ Ibid.

⁵⁴⁹ Ibid.

⁵⁵⁰ Ibid.

⁵⁵¹ “Ebola Outbreak in the Democratic Republic of the Congo Declared a Public Health Emergency of International Concern,” *World Health Organization* (Online), 17 July 2019.

⁵⁵² “Wuhan Institute of Virology Convenes Study by the Party Committee’s Plenary Central Group and Special Investigation and Study Meeting of the Educational Theme ‘Never Forgetting our Original Aspiration and Keeping Firmly in Mind our Mission’” (武汉病毒所召开党委扩大中心组学习暨 “不忘初心，牢记使命” 主题教育专题调研会议), *Wuhan Institute of Virology* (Online), 30 July 2019. For a general summary of the Xi speech, see Chris Buckley, “2019 is a Sensitive Year for China. Xi is Nervous,” *New York Times*, 25 February 2019.

⁵⁵³ The quoted text is “肖庚富强调，保证国家安全是头等大事。为维护政治，经济，社会等重点领域国家安全，我们必须始终保持高度警惕，既要警惕 ‘黑天鹅’ 事件，也要防范 ‘灰犀牛’ 事件。” Note that the second half of the quote was borrowed verbatim from Xi’s speech. “Wuhan Institute of Virology Convenes Study by the Party Committee’s Plenary Central Group and Special Investigation and Study Meeting of the Educational Theme ‘Never Forgetting our Original Aspiration and Keeping Firmly in Mind our Mission’” (武汉病毒所召开党委(扩大)中心组学习暨 “不忘初心，牢记使命” 主题教育专题调研会议), *Wuhan Institute of Virology* (Online), 30 July 2019.

⁵⁵⁴ Ibid. The quoted text is “我们要提高风险化解能力，透过现象看本质，力争把风险化解在源头，防止各种风险传导，叠加，演变，升级...”

⁵⁵⁵ Ibid. The quoted text is “他指出，P4 实验室的发展要注重和合文化，实验室内部要加强组织协调... 进一步增强所内员工的归属感，使 P4 实验室在生物安全大科学中心的建设中发挥更大的作用。”

⁵⁵⁶ Ibid. Emphasis added. The quoted text is “她指出，本次会议内容详实，重点突出，将提出的问题按轻重缓急的原则归类，优先解决当前面临的急迫性问题，并对下一步的工作进行部署和安排，确保责任落实到位，工作措施到位，推动研究所稳步持续的发展。”

⁵⁵⁷ Ibid. Emphasis added. The quoted text is “他通过聚焦‘卡脖子’问题，对标国家需求，从实验室的设施硬件及技术层面，生物安全管理，与研究所的协同发展，员工激励与奖励等方面，深入剖析了 P4 实验室当前存在的主要问题及解决问题的主要思路。”

⁵⁵⁸ James Le Duc and Zhi-ming Yuan, “Safety and Security in the Age of Synthetic Biology,” *Journal of Biosafety and Biosecurity*, 1 (2019), pg. 77-79, published in September 2019.

⁵⁵⁹ Ibid.

⁵⁶⁰ Ibid.

⁵⁶¹ See, Wang Xiaoli (王小理) and Tang Hong(唐宏), “Taking the Community of Common Destiny for Mankind as the Vision, Planning for Scientific and Technological Innovation to Prevent and Control Infectious Diseases” (王小理唐宏：以人类命运共同体视野谋划传染病防控科技创新), the *Study Times* reposted on the *Chinese Academy of Sciences* (Online), 16 August 2019.

⁵⁶² The “community of common destiny for mankind” (人类命运共同体) is the signature foreign policy slogan of Xi Jinping. For more information, see Liza Tobin, “Xi’s Vision for Transforming Global Governance: A Strategic Challenge for Washington and its Allies,” *Texas National Security Review*, Vol 2, Issue 1, November 2018.

⁵⁶³ The quoted text is “以人类命运共同体视野谋划传染病防控科技创新.” See Wang Xiaoli (王小理) and Tang Hong(唐宏), “Taking the Community of Common Destiny for Mankind as the Vision, Planning for Scientific and Technological Innovation to Prevent and Control Infectious Diseases” (王小理唐宏：以人类命运共同体视野谋划传染病防控科技创新), the *Study Times* reposted on the *Chinese Academy of Sciences* (Online), 16 August 2019.

⁵⁶⁴ Ibid. The quoted text is “重大传染病疫情并不遥远。”

⁵⁶⁵ Ibid. Emphasis added. The quoted text is “加快传染病防控科技创新必要而迫切。”

⁵⁶⁶ Ibid. The quoted text is “传染病疫情爆发有复杂的成因。”

⁵⁶⁷ Ibid. Emphasis added. The quoted text is “从威胁角度看，生物技术的进步增加了微生物被滥用或成为大流行病原体的风险。传染病病原体也可以是人为制造或是实验室事故无意泄漏的，例如 2017 年加拿大科学家成功合成类似天花的马痘病毒。”

⁵⁶⁸ UN Office for Disarmament Affairs, “New scientific and technological developments relevant to the Convention: background information document : addendum / submitted by the Implementation Support Unit,” Seventh Review Conference of the State Parties to the Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on Their Destruction, *United Nations Digital Library*, 23 November 2011, p. 4.

⁵⁶⁹ Liu Jie (刘杰), Ren Xiaobo (任小波), Yao Yuan (姚远), Chu Xin (褚鑫), Yi Xuan (易轩), and Su Ronghui (苏荣辉), “An Analysis of the Current Situation for Biosafety Problems in our Country and Countermeasures” (我国生物安全问题的现状分析及对策), *Bulletin of the Chinese Academy of Sciences*, 31 (4): pg. 387-393, 09 March 2016. Note: Yi Xuan was the expert affiliated with the WIV. The others were described as working for the CAS “Bureau of Major R&D Programs” (重大科技任务局) in Beijing.

⁵⁷⁰ Ibid. The quoted text is “人为合成的各类生物因子 (生物大分子如 XNA, 酶类, 合成生物如病毒, CRISPR/Cas9 等基因编辑技术产物及转基因生物等), 有助于各类生物因子的繁殖, 传播, 扩散等技术的开发, 滥用与吴用; 生物安全实验室危险物品等。”

⁵⁷¹ Ibid. Emphasis added. The quoted text is “各类生物危害的发生, 都是在一定适应性条件下, 某种或数种生物因子通过各自独特的繁殖 (复制) 与传播的方式, 集中暴发, 实现对人 (动植物) 及环境的危害. 包括两方面... (2) 人为, 如缺乏管控的生物技术开发活动; 高等级生物安全实验室危险材料外泄; 生物技术制品及技术的无序开发与商业化, 军事应用, 爆恐事件等。”

⁵⁷² Ibid. The quoted text is “病原体安全监管难度加大, 高等级生物实验室发生人为破坏或泄露的风险较大。”

⁵⁷³ Public health drills of this nature have been held at airports elsewhere in the world for years, and the drills at Chinese airports are not unusual in this regard. However, when one considers the tabletop exercise of an

unprecedented scale staged in July, these subsequent airport drills in August, and most conspicuously, the too-coincidental-to-be-coincidental drill that was held at the Wuhan Tianhe International Airport on September 18, it raises the possibility, at least, that these drills were not as routine as they may first appear.

⁵⁷⁴ “Shanghai Customs and Municipal Health Commission Sign Agreement on Joint Prevention Joint Control Cooperation, Simultaneously Hold Emergency Drills for World Import Expo” (上海海关与市卫生健康委联防联控合作协议签署, 进博会应急演练同时举行), the *Shanghai Municipal Health Commission and Shanghai Municipal Administration of Chinese Traditional Medicine* (Online), 13 August 2019.

⁵⁷⁵ The key quoted phrase is “此次演练模拟情景为我国驻某国企业暴发群体性不明原因疾病.” See, “Customs General Office Holds Port of Entry Sudden Public Health Incident Emergency Drill” (海关总署举办口岸突发公共卫生事件应急演练), *Xinhua News Agency*, 19 August 2019.

⁵⁷⁶ The quoted text is taken from the following line: “海关总署副署长张际文介绍说,此次演练是坚决贯彻习近平总书记“筑牢口岸检疫防线”重要指示精神.” See, “Improving Emergency Management Capabilities to Firmly Construct an Epidemic Inspection Line of Defense: The General Office of the Customs Administration Holds Emergency Drills for Sudden Public Health Incidents at Ports,” (提升处突能力筑牢检疫防线 海关总署举办口岸突发公共卫生事件应急演练), *Legal Daily* reprinted on the *Nanjing Municipal Customs Administration* (Online), 20 August 2019.

⁵⁷⁷ Ibid. The quoted passage is “张际文介绍,当前全球公共卫生形势十分复杂严峻,防范传染病特别是重大新发突发传染病跨境传播,时不我待,刻不容缓.”

⁵⁷⁸ The quoted text is drawn from the passage “中国疾病预防控制中心,军事医学研究院相关专家认为,当前国际疫情形势严峻复杂,举办应急演练至关重要,此次应急演练贴近实际...” See, “Customs General Office Holds Port of Entry Sudden Public Health Incident Emergency Drill” (海关总署举办口岸突发公共卫生事件应急演练), *Xinhua News Agency*, 19 August 2019.

⁵⁷⁹ There was a localized outbreak of Ebola underway in North Kivu and Ituri provinces of the war-torn Democratic Republic of the Congo in 2019, and while the WHO had declared the outbreak a “Public Health Emergency of International Concern” in July, there had been no cases outside of the Congo and the WHO judged that “global risk levels remain low” for Ebola in updates that it provided in August before these PRC officials made their comments. See, “Ebola Outbreak in the Democratic Republic of the Congo Declared a Public Health Emergency of International Concern,” *World Health Organization* (Online), 17 July 2019, and “Ebola Virus Disease – Democratic Republic of the Congo,” *World Health Organization*, 15 August 2019. Saudi Arabia had also reported seven cases of the MERS coronavirus in June 2019, but MERS is not airborne, and it had displayed a limited ability to sustain human-to-human transmission since it was first detected in 2012. Only 2,449 total cases of MERS had been reported worldwide (mostly in the Middle East) from 2012 to July 2019, including just one imported case to China in 2015. The WHO did not advise member states to take any special measures in response to the cases of MERS reported in Saudi Arabia in June 2019, only standard surveillance for acute respiratory infections. See, “Middle East Respiratory Syndrome Coronavirus (MERS-CoV),” *World Health Organization*, 24 July 2019. Yanzhong Huang, “Does MERS Pose a Serious Threat to China?,” *The Council on Foreign Relations*, 02 June 2015.

⁵⁸⁰ A’Lin’Na (阿琳娜), “Xi’an Customs Holds Port of Entry Sudden Outbreak Public Health Incident Emergency Response Drill” (西安海关举办口岸突发公共卫生事件应急处置演练), *Chinanews.com*, 20 August 2019.

⁵⁸¹ Guizhen Wu, “Laboratory Safety in China: Past, Present, and Future,” *Biosafety and Health*, Volume 1, Issue 2, September 2019, pages 56-58, available online on 31 October 2019.

⁵⁸² Ibid. Emphasis added.

⁵⁸³ The quoted text is “找差距,抓落实,努力开创生物安全科技创新.” See “Wuhan Institute of Virology Convenes Situational Report Meeting for Educational Theme of ‘Staying True to our Original Aspiration, Firmly Keeping in Mind our Mission’ and Situational Report Meeting for Rectification” (武汉病毒所召开 “不忘初心,牢记使命” 主题教育工作情况通报会暨整改情况通报会), *Wuhan Institute of Virology* (Online), 28 August 2019.

⁵⁸⁴ Ibid. The quoted text is “针对影响研究所发展的关键问题及职工关注的热点问题.”

⁵⁸⁵ Ibid. The quoted text is “形成了由 5 个方面共计 20 个问题组成的检视问题清单.”

⁵⁸⁶ Ibid. The quoted text is “对于能够立查立改的问题,认真开展了专项整治,明确分工,压实责任,责成分管所领导和相关部门限期完成;对于需要持续整改的问题,注重顶层设计,层层细化...通过精心组织,周密安排,通力合作,以钉钉子的精神,加快推进专项整治各项工作确保改到位,改彻底.”

⁵⁸⁷ Ibid. Emphasis added. The quoted text is “肖庚富在总结中强调，此次主题教育既是一次思想整治的洗礼，也是对研究所的一次‘全面体验’。通过对制约研究所发展关键问题的持续整改落实，我们坚信，武汉病毒所有信心，有能力，做好高等级生物安全实验室建设，维护和管理工作。”

⁵⁸⁸ The characters for the officials name are 汪大国. See “Wuhan Institute of Virology Opens a Special Democratic Life Meeting and Special Topic Meeting of the Party Committee on Searching for Disparities [Between our Work] and the Party Constitution and Party Regulations” (武汉病毒所召开党委对照党章党规找差距专题会和专题民主生活会), *Wuhan Institute of Virology* (Online), 30 August 2019.

⁵⁸⁹ Ibid. The quoted text is “对照党章党规，从思想，政治，作风，能力，廉政等五个方面，开诚布公地查找不足，分析问题，开展批评和自我批评，提出整改措施，真正达到红脸出汗，增进团结的效果。”

⁵⁹⁰ Emphasis added. The quoted text is “加强顶层设计，解决制约研究所发展的重要问题。” See, “Wuhan Institute of Virology Convenes Meeting to Report on the Status of Special Democratic Life Meetings” (武汉病毒所召开专题民主生活会情况通报会), *Wuhan Institute of Virology* (Online), 30 August 2019.

⁵⁹¹ “State Key Research and Development Plan’s 2018-2019 Project on ‘Sudden Cross-Species Infection and Transmission of Major Zoonotic Pathogens’ Progress Meeting Successfully Convenes” (国家重点研发计划‘重大突发动物源性人兽共患病跨种感染与传播机制研究’2018-2019年度项目推进会成功召开), *National Institute for Viral Disease Control and Prevention of the PRC Center for Disease Control and Prevention* (Online), 20 September 2019.

⁵⁹² Ibid.

⁵⁹³ See author affiliations for Wenjie Tan, et. al., “Genomic Characterization and Epidemiology of 2019 Novel Coronavirus: Implications for Virus Origins and Receptor Binding,” *The Lancet*, 22 February 2020; 395(10224):565-574, published online on 30 January 2020.

⁵⁹⁴ The quoted text is “总结了项目组立项以来在冠状病毒，西尼罗河病毒，基孔肯亚热病毒等重要人兽共患病病原跨种感染与传播机制研究中取得重要进展，亮点工作以及成果产出。” See, “State Key Research and Development Plan’s 2018-2019 Project on ‘Sudden Cross-Species Infection and Transmission of Major Zoonotic Pathogens’ Progress Meeting Successfully Convenes” (国家重点研发计划‘重大突发动物源性人兽共患病跨种感染与传播机制研究’2018-2019年度项目推进会成功召开), *National Institute for Viral Disease Control and Prevention of the PRC Center for Disease Control and Prevention* (Online), 20 September 2019.

⁵⁹⁵ “Safe Production has No ‘Inspection-Exempted Work Units’, Much Less ‘No Worries Work Units’,” (安全生产没有“免检单位,”更没有“放心单位”), the *Chinese Academy of Sciences* (Online), 03 September 2019.

⁵⁹⁶ While “safe production” (安全生产) sounds most applicable to industrial and manufacturing settings in English, its use in Chinese is broader, and can be used to refer to everything from laboratory operations to the manufacturing of commercial goods. It was used to refer to biosafety at the WIV in April and May 2019 reports previously cited in this chronology.

⁵⁹⁷ “Safe Production has No ‘Inspection-Exempted Work Units’, Much Less ‘No Worries Work Units’,” (安全生产没有“免检单位,”更没有“放心单位”), the *Chinese Academy of Sciences* (Online), 03 September 2019.

⁵⁹⁸ Ibid. The quoted text is “抓安全也不是一劳永逸的事情.有些工作暂时放一放恐怕也无大碍，但安全却一刻也不得放松，必须十二分地小心在意，天天抓，时时抓。”

⁵⁹⁹ Ibid. The quoted text is “一旦放松了安全，就极有可能‘引火烧身’，‘烧’至令人痛心疾首，悔之无及的地步。”

⁶⁰⁰ Ibid. The quoted text is “作为监管部门，也要把‘放心单位’纳入监管视线内，切不可‘一俊遮百’，只看到其‘亮点’，看不到其‘短板’，不能因为是标杆企业就‘放放手’，‘放一马’，致使企业失去外在的约束，监督，不知不觉中放松管理，放松了规范化操作要求，甚至刻意隐瞒自己存在的问题，问题越积累越多，越积累越严重，最终造成难以弥补的后果。”

⁶⁰¹ The quoted text is “领导干部要主动投身到各种斗争中去，在大是大非面前敢于亮剑，在矛盾冲突面前敢于迎难而上，在危机困难面前敢于挺身而出，在歪风邪气面前敢于坚决斗争。” See, “Xi Jinping Delivers Important Speech at the Opening Ceremony of the Central Party School’s (Chinese Academy of Governance) Young Cadres Training Class” (习近平在中央党校（国家行政学院）中青年干部培训班开班式上发表重要讲话), *Xinhua News Agency* re-posted on the *Central Government of the People’s Republic of China* (Online), 03 September 2019.

⁶⁰² Ibid. David Bandurski, “The Party is Struggling,” *China Media Project*, 06 September 2019.

⁶⁰³ Ibid. The quoted text is “习近平强调, 斗争是一门艺术, 要善于斗争. 在各种重大斗争中, 我们要坚持增强忧患意识和保持战略定力相统一, 坚持战略判断和战术决断相统一, 坚持斗争过程和斗争实效相统一. 领导干部要守土有责, 守土尽责, 召之即来, 来之能战, 战之必胜.”

⁶⁰⁴ Ibid. The quoted text is “习近平强调, 中华民族伟大复兴, 绝不是轻轻松松, 敲锣打鼓就能实现的, 实现伟大梦想必须进行伟大斗争.”

⁶⁰⁵ Ibid. Emphasis added. The quoted text is “在前进道路上我们面临的风险考验只会越来越复杂, 甚至会遇到难以想象的惊涛骇浪. 我们面临的各种斗争不是短期的而是长期的, 至少要伴随我们实现第二个百年奋斗目标全过程. 必须...坚定斗争意志, 当严峻形势和斗争任务摆在面前时, 骨头要硬, 敢于出击 敢战能胜.”

⁶⁰⁶ Ibid. Emphasis added. The quoted text is “领导干部要经受严格的思想淬炼, 政治历练, 实践锻炼, 在复杂严峻的斗争中经风雨, 见世面, 壮筋骨, 真正锻造成为烈火真金.”

⁶⁰⁷ Ibid. Emphasis added. The quoted text is “要坚持在重大斗争中磨砺, 越是困难大, 矛盾多的地方, 越是形势严峻, 情况复杂的时候, 越能练胆魄, 磨意志, 长才干.”

⁶⁰⁸ “Wuhan Municipal People’s Government General Office Notice Regarding the Issuance of the Implementation Plan for Reforming and Improving the Comprehensive Supervision System of the Medical and Health Industries in Wuhan” (市人民政府办公厅关于印发武汉市改革完善医疗卫生行业综合监管制度实施方案的通知), *Wuhan Municipal People’s Government* (Online), 21 April 2020. Note that while the document was created on 05 September 2019 and distributed to the relevant offices on 17 September 2019, it does not appear to have been published online until 21 April 2020.

⁶⁰⁹ Ibid. The document’s index number (K28044908/2020-810796) indicates that it was published in 2020, as does the date on the URL (http://www.wuhan.gov.cn/zwgk/xxgk/zfwj/bgtwj/202004/t20200421_1039064.shtml).

⁶¹⁰ See, “Guiding Opinion of the General Office of the State Council on Reforming and Improving the Comprehensive Supervision System of Medical and Health Industries” (国务院办公厅关于改革完善医疗卫生行业综合监管制度的指导意见), *The Central Government of the People’s Republic of China* (Online), 2018 (Document No. 63), 03 August 2018.

⁶¹¹ The same directive for Guangzhou municipality, by contrast, came only five months after its provincial government of Guangdong released its directive.

⁶¹² Beijing’s directive was released on 19 January 2020, just three days before Wuhan was placed on lockdown, and Shanghai’s directive was released on 29 April 2020.

⁶¹³ The quoted text is “主要任务及责任分工.” See “Wuhan Municipal People’s Government General Office Notice Regarding the Issuance of the Implementation Plan for Reforming and Improving the Comprehensive Supervision System of the Medical and Health Industries in Wuhan” (市人民政府办公厅关于印发武汉市改革完善医疗卫生行业综合监管制度实施方案的通知), the *Wuhan Municipal People’s Government* (Online), 21 April 2020.

⁶¹⁴ Ibid. The quoted text is “坚持和加强党的全面领导.”

⁶¹⁵ Ibid. The quoted text is “加强公立医院党的领导, 落实党委领导下的院长负责制, 健全“医院党委—党总支—党支部”三级党组织架构, 坚持党组织活动与业务工作有机融合, 推进活动创新、思想政治工作内容载体创新.”

⁶¹⁶ Ibid. “Party building” is 党建 and “join hands” is 联手.

⁶¹⁷ Ibid. The quoted text is “深化公共卫生服务监管.”

⁶¹⁸ Ibid. The quoted text is “依法加强对... 传染病防治, 实验室生物安全... 公共卫生服务的监管.”

⁶¹⁹ Ibid. The quoted text is “加强对...重大传染病规范报病、规范治疗和随访管理的监督检查.”

⁶²⁰ Ibid. The quoted text is “加强对公立医院公共卫生科能力建设和服务质量的考核, 确保完成公共卫生服务、突发事件卫生应急处置、紧急医学救援等任务.”

⁶²¹ The quoted text is “管理人员面对繁杂工作, 要保持耐心, 善于运用科学思维, 坚持以问题为导向, 主动思考解决问题的方式方法, 要有‘咬定青山不放松’的干事精神, 将工作做出成效.” See “Wuhan Institute of Virology Party Branches Launch Specialized Educational Organization Life Meeting on ‘Staying True to our Original Aspiration, Firmly Keeping in Mind our Mission’”(武汉病毒所机关党支部召开‘不忘初心, 牢记使命’主题教育专题组织生活会), *Wuhan Institute of Virology* (Online), 17 September 2019.

⁶²² “Central Committee No. 15 Patrol Inspection Group Opens Meeting on the Inspection of the Party Organization of the Chinese Academy of Sciences and its Mobilization Work” (中央第十五巡视组巡视中国科学院党组工作动

员会召开), *China Science Daily* as reprinted on the *Chinese Academy of Sciences* (Online), 16 September 2019.

“Central Committee No. 15 Patrol Inspection Group Gives Feedback on Inspection Situation to Chinese Academy of Sciences Party Organization” (中央第十五巡视组向中国科学院党组反馈巡视情况), *CCP Central Commission on Discipline Inspection* (Online), 10 January 2020.

⁶²³ The quoted text is 苏波指出, 巡视是政治监督, 是对中央和国家机关党组织履行政治责任和职责使命情况的全面政治体检。 “Central Committee No. 15 Patrol Inspection Group Opens Meeting on the Inspection of the Party Organization of the Chinese Academy of Sciences and its Mobilization Work” (中央第十五巡视组巡视中国科学院党组工作动员会召开), *China Science Daily* as reprinted on the *Chinese Academy of Sciences* (Online), 16 September 2019.

⁶²⁴ Ibid. The quoted text is 重点是关于违反政治纪律、组织纪律、廉洁纪律、群众纪律、工作纪律和生活纪律等方面的举报和反映。

⁶²⁵ Ibid. The quoted text is 把“两个维护”作为根本任务 和 深入查找政治偏差。

⁶²⁶ We have opted to use the official CCP translation of “两个维护” as the “two upholds.” Alternative translations include the “two safeguards,” the “two defends,” and the “two protects.”

⁶²⁷ “Where the Significant Meaning of the ‘Two Upholds’ Comes From” (“两个维护”的重大意义从何而来) Seeking Truth (求是), 09 January 2021. “Full Text: Communiqué of 6th plenary session of 19th CPC Central Committee,” *Xinhua News Agency* posted on the *National People’s Congress* (Online), 11 November 2021. Xu Wei, “Upholding Core Position of Xi is Vital Requirement,” *China Daily*, 13 November 2021. “CPC Meeting Underlines Core Status of Xi,” *Xinhua*, 27 December 2018. James Palmer, “In Xi’s Little Red Article, the Monotony is the Point,” *Foreign Policy*, 17 July 2020.

⁶²⁸ “Central Committee No. 15 Patrol Inspection Group Gives Feedback on Inspection Situation to Chinese Academy of Sciences Party Organization” (中央第十五巡视组向中国科学院党组反馈巡视情况), the *CCP Central Commission on Discipline Inspection* (Online), 10 January 2020.

⁶²⁹ Ibid. The quoted text is “巡视也发现一些问题, 主要是: 贯彻习近平总书记 ‘三个面向’ ‘四个率先’ 重要指示批示精神尚有差距, 落实加强党的全面领导要求不够到位... 院士管理监督工作存在薄弱环节... 形式主义、官僚主义以及违反中央八项规定精神问题依然存在... 选人用人坚持政治标准不够...”

⁶³⁰ Ibid. The quoted text is “以实际行动践行 ‘两个维护’” and “进一步做好院士增选和管理监督工作。”

⁶³¹ See, “Wuhan Institute of Virology Convenes Centralized Warning Education Plenary Meeting and Internal Audit Work Activation Meeting” (武汉病毒所召开集中警示教育大会暨内部审计工作启动会), *Wuhan Institute of Virology* (Online), 06 September 2019.

⁶³² See, Hans Kühner, “Between Autonomy and Planning: The Chinese Academy of Science in Transition,” *Minerva*, Vol. 22, No. 1, March 1984, p.15-16.

⁶³³ See Richard P. Suttmeier, Cong Cao, and Denis Fred Simon, “China’s Innovation Challenge and the Remaking of the Chinese Academy of Sciences,” *Innovations Journal*, Summer 2006, MIT University Press: Cambridge, MA, p. 80-81.

⁶³⁴ “Complete Feedback from the Fourth Round of Inspections of the 19th Central Committee is Released”(十九届中央第四轮巡视反馈情况全部公布), *CCP Central Commission for Discipline Inspection* (Online), 10 January 2020.

⁶³⁵ This data was found on the online Scientific Database Service Monitoring and Statistics System of Chinese Academy of Sciences, the WIV’s parent organization. This finding was first reported by the DRASTIC Research Group. Senator Rubio’s staff reviewed the original Chinese source and confirmed their finding. See, DRASTIC Research Group, “An Investigation into the WIV Databases that were Taken Offline,” *Research Gate*, February 2021, p. 2-3, 5-6.

⁶³⁶ The WIV called the database the Wildlife-Borne Viral Pathogen Database in its English publications, but a more precise translation would be the Wildlife-Borne Viral Pathogen Characteristic Database (野生动物携带病毒病原特色数据库). The database was managed by coronavirus expert Shi Zhengli, Director of the WIV Research Center for Emerging Infectious Diseases and the CAS Key Laboratory of Special Pathogens, and Deputy Director of the Wuhan National Biosafety Laboratory (BSL-4). In addition the original DRASTIC report cited above, the basic facts related to the removal of the database can also be found in the investigative report by Katherine Eban, “The Lab Leak Theory: Inside the Fight to Uncover COVID-19’s Origins,” *Vanity Fair*, 03 June 2021.

⁶³⁷ The Editorial Board, “We’re still missing the origin story of this pandemic. China is sitting on the answers,” *The Washington Post*, 05 February 2021. DRASTIC Research Group, “An Investigation into the WIV Databases that were Taken Offline,” *Research Gate*, February 2021, p. 2-3, 5-6.

⁶³⁸ DRASTIC Research Group, “An Investigation into the WIV Databases that were Taken Offline,” *Research Gate*, February 2021, p. 5. Scientific Database Service Monitoring and Statistics System of the Chinese Academy of Sciences (Online), as archived by DRASTIC Research Group, p. 7.

⁶³⁹ Attempts to access the WIV database as recently as June 2022 were unsuccessful. The website is <http://batvirus.whiov.ac.cn/>

⁶⁴⁰ DRASTIC Research Group, “An Investigation into the WIV Databases that were Taken Offline,” *Research Gate*, February 2021, p. 5.

⁶⁴¹ Don Tse and Larry Ong, “Coronavirus Pushes CCP Factional Struggle to Inflection Point,” *SinoInsider*, April 2020, p. 15.

⁶⁴² The Editorial Board, “We’re still missing the origin story of this pandemic. China is sitting on the answers,” *Washington Post*, 05 February 2021. DRASTIC Research Group, “An Investigation into the WIV Databases that were Taken Offline,” *Research Gate*, February 2021.

⁶⁴³ DRASTIC Research Group, “An Investigation into the WIV Databases that were Taken Offline,” *Research Gate*, February 2021, p. 7.

⁶⁴⁴ *Ibid*, p. 1.

⁶⁴⁵ John Sudworth, “Covid: Wuhan Scientist Would ‘Welcome’ Visit Probing Lab Leak Theory,” *BBC News*, 21 December 2020.

⁶⁴⁶ Tweet from @Tommy_Cleary, 11:38 AM, March 10, 2021, as cited by DRASTIC Research Group, “An Investigation into the WIV Databases that were Taken Offline,” *Research Gate*, February 2021, p. 5.

⁶⁴⁷ DRASTIC Research Group, “An Investigation into the WIV Databases that were Taken Offline,” *Research Gate*, February 2021, p. 5.

⁶⁴⁸ “Sustaining the Response: Inside the WHO-China Mission,” Chatham House as live streamed on YouTube, 10 March 2021, <https://www.youtube.com/watch?v=GMlIEF58944&t=3249s>

⁶⁴⁹ *Ibid*.

⁶⁵⁰ Sharon Lerner, Mara Hvistendahl, and Maia Hibbett, “NIH Documents Provide New Evidence U.S. Funded Gain-of-Function Research in Wuhan,” *The Intercept*, 10 September 2021.

⁶⁵¹ The exact language from the proposal was “We will be running RNA Extractions from 1,000 bats per year (three samples per bat: oral, anal, and blood) in each year of the project.” See, Peter Daszak (Principal Investigator), “Notice of Award: Understanding the Risk of Bat Coronavirus Emergence,” U.S. Department of Health and Human Services, National Institutes of Health, National Institute of Allergy and Infectious Diseases, 27 May 2014, p. 84. The Notice of Award and the original proposal were published by *the Intercept* on 10 September 2021.

⁶⁵² The official project tender number was ZB0109-1909-ZCFW0943. See, “Corrected Announcement of Procurement Project for Security Services at the Zhengdian Science and Technology Campus of the Chinese Academy of Sciences Wuhan Institute of Virology” (中国科学院武汉病毒研究所郑店科技园园区保安服务采购项目更正公告), *Chinese Government Procurement Network* (中国政府采购网), published on 12 September 2019 and corrected on 19 September 2019. Thanks to the DRASTIC Research Group for locating this document and archiving it. <https://archive.ph/r0VWa#selection-149.0-152.0>

⁶⁵³ The official project tender number was ZB0109-1909-ZCHW0913. See “Competitive Bid on Chinese Academy of Sciences Wuhan Institute of Virology Central Air Conditioning Renovation Project” (中国科学院武汉病毒研究所中央空调改造工程竞争性磋商), *Chinese Government Procurement Network* (中国政府采购网), 16 September 2019. Thanks to the DRASTIC Research Group for locating this document and archiving it. <https://archive.ph/bfoTD>

⁶⁵⁴ *Ibid*.

⁶⁵⁵ Ai Hongxia (艾红霞), “Testing Begins for Special Passage through Airport for Military World Games” (军运会航空口岸专用通道开通测试), *Hebei Daily* reprinted by *Xinhua News Agency*, 26 September 2019.

⁶⁵⁶ *Ibid*. The quoted text is “演练以实战形式，模拟了... 机场口岸通道发现 1 例新型冠状病毒感染的处置全过程，演练了从流行病学调查、医学排查、临时检疫区域设置、隔离留验、病例转送和卫生处理等多个环节。”

⁶⁵⁷ Yang Jun (杨均), “Wuhan Customs Hold Emergency Response Drill for Sudden Incidents at the Port of Entry as [Enter] 30-day Countdown to Military World Games” (武汉海关举办军运会倒计时 30 天暨口岸突发事件应急处

置演练), *Chutian Transportation Broadcasting* reprinted on *Sina.com*, 18 September 2019. Since this report has been removed from the Sina website, we include the relevant paragraph from which the quote was extracted here: “另据武汉机场海关副关长李真涵介绍, 该关前期做了大量工作全力保障军运会口岸安全, 制定了口岸核与辐射安全事件、化学类突发事件、生物类突发事件、口岸食源性疾病突发事件、口岸突发公共卫生事件、口岸动植物检疫突发事件等 8 个应急预案; 建立了覆盖全面、快速反应、高效运转、处置得当的应急处置体系; 成立了处置专家组和联络组; 启用了门户式核辐射监测系统, 形成了初探报警、定量定性分析和个人防护一体化的辐射探测工作机制; 加强了与省卫健委、中科院武汉病毒所合作, 建立疫情通报、病例转送和重点传染病研究合作机制; 实时开展专项实战化培训、桌面推演和大型实战化演练, 强化应急协调处置能力; 建全口岸快筛室, 增派护士驻点提高采样送样质量。” For another local media report that mentioned the exercise, but not the quote from Li Zhenhan, see Zhou Dan (周丹), “Guard the Security of the Nation’s Gates, Guarantee the Safety of the Military World Games: Wuhan Customs Drill Sudden Incident Emergency Response at the Port of Entry” (守国门安全, 保军运平安: 武汉海关演练口岸突发事件应急处置), *Chutian Metropolis Daily*, 18 September 2019.

⁶⁵⁸ The quoted text is “双方将在新发突发传染病风险分析与预警预测, 高致病性病原检测技术的研发应用, 生物安全人才培养与交流, 病原资源数据共享等方面开展广泛科技合作。” “Wuhan Institute of Virology Signs Strategic Cooperation Agreement with the Wuhan Customs Administration” (武汉病毒所与武汉海关签署战略合作协议), *Wuhan Institute of Virology* (Online), 01 July 2019.

⁶⁵⁹ Li Xiaolin (李晓琴), “Wuhan Tianhe Airport Holds Ebola Outbreak Prevention and Control Exercise,” (武汉天河机场举行埃博拉疫情防控演练), *Chutian Metropolis Daily*, 13 November 2014.

⁶⁶⁰ “2014-2016 Ebola Outbreak in West Africa,” *U.S. Centers for Disease Control and Prevention* (Online), accessed on 15 December 2021.

⁶⁶¹ We searched and reviewed public reports from 2007 to 2019.

⁶⁶² Beijing focused on avian flu while Shanghai chose an unspecified infectious disease. “Capital Airport Holds Olympics Safety Emergency Drills” (首都机场举行奥运安全应急演练), *CCTV* as reprinted by *Sina.com*, 27 June 2008. “Shanghai World Expo Inspection and Quarantine Emergency Preparedness Drills and Tests” (上海世博会检验检疫应急预案演练侧记), PRC State Administration for Market Regulation’s website *China Quality News*, 02 April 2010.

⁶⁶³ Don Tse and Larry Ong, “Coronavirus Pushes CCP Factional Struggle to Inflection Point,” *SinoInsider*, April 2020, p. 35.

⁶⁶⁴ “Executive Summary: Actions for Leaders to Take,” from *A World at Risk: Annual Report on Global Preparedness for Health Emergencies*, *Global Preparedness Monitoring Board* (Online), 10 September 2019, p. 3.

⁶⁶⁵ *Ibid.*, p. 4.

⁶⁶⁶ “Board,” *Global Preparedness Monitoring Board* (Online), last accessed on 12 December 2021.

⁶⁶⁷ George Fu Gao, “For a Better World: Biosafety Strategies to Protect Global Health,” *Biosafety and Health* 1 (1) (2019), p. 2.

⁶⁶⁸ “Preparedness for a High-Impact Respiratory Pathogen Pandemic,” *Johns Hopkins Center for Health Security* posted on the *Global Preparedness Monitoring Board* (Online), 10 September 2019, p. 58-59.

⁶⁶⁹ “Explanation Regarding the Draft Biosecurity Law of the People’s Republic of China” (关于中华人民共和国生物安全法草案的说明), *The National People’s Congress* (Online), 19 October 2020. Note: The explanation was delivered by Gao Hucheng, Chairman of the Environment Protection and Resources Conservation Committee, to the NPC Standing Committee on 21 October 2019, but it was not published until two days after the bill’s final passage in October 2020.

⁶⁷⁰ “PCR Purchasing Report Wuhan China,” *Internet 2.0 Relentless Security*, October 2021, p. 9. Jamie Tarabay, “Bloomberg Government: China PCR Purchases Increased Before First Known Covid Cases,” *Bloomberg Government*, 04 October 2021.

⁶⁷¹ *Ibid.*

⁶⁷² Ian Birrell, “Is ‘Patient Su’ Covid’s Patient Zero?,” *The Daily Mail*, 29 May 2021.

⁶⁷³ Emphasis added. The quoted text is “比如有一个 9 月 29 日发病的患者数据, 数据显示患者没有进行核酸检测, 临床诊断 (CT 诊断) 为疑似病例, 患者已死亡, 这个数据没有确诊, 也没有死亡时间, 也有可能是错误数据。” See, Wang Zhenya, “Expert Assesses the Source of the Novel Coronavirus: December 8 of Last Year May Not be the

Earliest Time of Onset,” (专家研判新冠源头: 去年 12 月 8 日或许不是最早发病时间), *Health Times* (健康时报网), 27 February 2020.

⁶⁷⁴ We note that this is a state-run hospital directly under the Hubei provincial authorities. “Rongjun” refers to military veterans or disabled soldiers discharged from the military. The hospital website describes it as “having a glorious revolutionary history.”

⁶⁷⁵ Ian Birrell, “Is ‘Patient Su’ Covid’s Patient Zero?,” *The Daily Mail*, 29 May 2021.

⁶⁷⁶ *Ibid.*

⁶⁷⁷ This video conference was reported by the Fuzhou Municipal Health Commission in Jiangxi province. No other report of this video conference could be found, even though it was clearly national in scope, which suggests that its disclosure to the public may have been in error. “Municipal Health Commission Watches National Health System Biosecurity and Fire Prevention Work Video Conference” (市卫健委收看国家卫生健康系统生物安全和消防工作视频会), *Fuzhou Municipal People’s Government* (Online), 26 September 2019.

⁶⁷⁸ “China Anniversary: Beijing Celebrations Mark 70 Years of Communist Rule,” *BBC News*, 01 October 2019. “Xi Focus: President Xi reviews armed forces on National Day for first time,” *Xinhua*, 01 October 2019.

⁶⁷⁹ The quoted text is “提高政治站位, 扛起安全生产重任.” See, “Municipal Health Commission Watches National Health System Biosecurity and Fire Prevention Work Video Conference” (市卫健委收看国家卫生健康系统生物安全和消防工作视频会), *Fuzhou Municipal People’s Government* (Online), 26 September 2019.

⁶⁸⁰ *Ibid.* The quoted text is “深化隐患排查整治. 组织开展一次地毯式, 全覆盖, 无死角的安全排查...”

⁶⁸¹ *Ibid.* The quoted text is “做好突发事件和重大事件信息报送, 保证 ‘首报’ 质量, 及时报送事件的重要信息, 为集中力量解决问题争取时间...”

⁶⁸² Virginia L. Ma and Meera S. Nair, “Coronavirus May Have Spread in China Last August, Preliminary Harvard Study Suggests,” *The Harvard Crimson*, 12 June 2020. John S. Brownstein, et al., “Analysis of hospital traffic and search engine data in Wuhan China indicates early disease activity in the Fall of 2019,” *Harvard Library* (2020), p 3.

⁶⁸³ *Ibid.*

⁶⁸⁴ Russell J. Westergard, “Surviving the Outbreak: Reflections on ConGen Wuhan’s Evacuation and Life in Quarantine,” *STATE Magazine*, April 2020.

⁶⁸⁵ DRASTIC Research Group, “The October Surprise in Wuhan,” *Research Gate*, October 2021, p. 5.

⁶⁸⁶ DRASTIC Research Group, “Wuhan Laboratories, Bat Research, and Biosafety,” *Research Gate*, April 2021, p. 8.

⁶⁸⁷ *Ibid.*

⁶⁸⁸ Jasper Becker, *Made in China: Wuhan, Covid, and the Quest for Biotech Supremacy*, (London: C. Hurst & Co. Ltd., 2021), p. 166-167.

⁶⁸⁹ “About Event 201,” *Johns Hopkins Center for Health Security* (Online), accessed on 15 December 2021.

⁶⁹⁰ “The Event 201 Scenario,” *Johns Hopkins Center for Health Security* (Online), accessed on 15 December 2021.

⁶⁹¹ “Event 201 Players,” *Johns Hopkins Center for Health Security* (Online), accessed on 15 December 2021.

⁶⁹² Chris Elias of the Gates Foundation was the other participant from the Global Preparedness Monitoring Board.

⁶⁹³ “Military World Games Opens in Wuhan, Ushering in New Era,” *XinhuaNet*, 18 October 2019.

⁶⁹⁴ Josh Rogin, “Congress is Investigating Whether the 2019 Military World Games in Wuhan was a COVID-19 Superspreader Event,” *Washington Post*, 23 June 2021. Michael Houston, “More Athletes Claim They Contracted COVID-19 at Military World Games in Wuhan,” *Inside the Games* (Online), 17 May 2020. Kelly-Ann Mills, “French Army Returned from Wuhan Military Games in October with Mystery Illness,” *The Mirror*, 07 May 2020. Tristin Hopper, “First Reading: Could a Prior Chinese International Sports Event Have Seeded COVID-19 in Canada?,” *The National Post*, 15 December 2021.

⁶⁹⁵ Tom Squitieri, “Did the Military World Games Spread COVID-19?,” *The American Prospect*, 30 June 2020. “Eleven Athletes in Iran Have Died of Coronavirus Infection,” *Radio Farda*, 22 March 2020.

⁶⁹⁶ Amy Elise Winter, “The Impact of the World Military Games on the COVID-19 Pandemic,” *Irish Journal of Medical Science*, 19 January 2021, p. 1

⁶⁹⁷ “Explanation Regarding the Draft Biosecurity Law of the People’s Republic of China” (关于中华人民共和国生物安全法草案的说明), *The National People’s Congress* (Online), 19 October 2020.

⁶⁹⁸ *Ibid.* The quote is “防范和禁止利用生物及生物技术侵害国家安全为重点.” For an English source, see Don Tse and Larry Ong, “Coronavirus Pushes CCP Factional Struggle to Inflection Point,” *SinoInsider*, April 2020, p. 10.

⁶⁹⁹ “Draft Biosecurity Law Creates Penalties for Misuse of Biotechnology and Other [Mis]Conduct” (生物安全法草案拟对生物技术谬用等行为作出处罚), *Xinhua* reprinted on the *National People’s Congress* (Online), 21 October 2019. The quoted text is “针对我国法律对前一时期的生物技术谬用等行为和事件，缺乏相应处罚规定的问题，草案明确了相应的责任及处罚，填补了法律空白。”

⁷⁰⁰ Ibid. The quoted text is “草案规范、调整的范围分为八大类：一是防控重大新发突发传染病、动植物疫情；二是研究、开发、应用生物技术；三是保障实验室生物安全；四是保障我国生物资源和人类遗传资源的安全；五是防范外来物种入侵与保护生物多样性；六是应对微生物耐药；七是防范生物恐怖袭击；八是防御生物武器威胁。”

⁷⁰¹ Gao’s report references a “实验室生物泄漏。” See, “Explanation Regarding the Draft Biosecurity Law of the People’s Republic of China” (关于中华人民共和国生物安全法草案的说明), *The National People’s Congress* (Online), 19 October 2020.

⁷⁰² Ibid. Emphasis added. The quoted text is “生物技术在带给人类进步和益处的同时，也带来生物安全问题和威胁。当前我国生物安全形势严峻，生物战和以非典、埃博拉病毒、非洲猪瘟等为代表的重大新发突发传染病及动植物疫情等传统生物威胁依然多发，生物恐怖袭击、生物技术误用谬用、实验室生物泄漏等非传统生物威胁凸显。”

⁷⁰³ Ibid. The quoted text is “亟待通过生物安全立法应对上述挑战，用法律划定生物技术发展边界，引导和规范人类生物技术的研发应用，促进生物技术健康发展，防止和减少由生物技术侵害行为带来的危害。”

⁷⁰⁴ Ibid. Emphasis added. The quoted text is “当前，我国在生物技术研发、基础设施建设上相对落后，在技术、产品和标准上存在较大差距，生物安全原创技术少，优秀成果少。”

⁷⁰⁵ Ibid. The quoted text is “将国家生物安全能力建设纳入法律... 牢牢掌握核心关键生物技术, 依法保障和推进我国生物技术的发展, 提升防范风险和威胁的能力。”

⁷⁰⁶ See, “The Chinese Communist Party Central Committee Decision on Several Major Problems Concerning Adhering to and Improving upon the Socialist System with Chinese Characteristics and Promoting the Modernization of the National Governance System and Governance Capabilities” (中共中央关于坚持和完善中国特色社会主义制度推进国家治理体系和治理能力现代化若干重大问题的决定), *Xinhua News Agency* reposted on the *Hubei Provincial People’s Government* (Online), 08 November 2019. Note: the decision was made on October 31 and Xinhua first published it on November 5.

⁷⁰⁷ Ibid. The quoted text is “加强公共卫生防疫和重大传染病防控，健全重特大疾病医疗保险和救助制度。”

⁷⁰⁸ Ibid. The quoted text is “强化国家战略科技力量，健全国家实验室体系。”

⁷⁰⁹ Sharri Markson, *What Really Happened in Wuhan*, Sydney, Australia: HarperCollins Publishers, September 2021, pg. 2, 5. Note that Senator Rubio’s staff has independently verified Markson’s account of this conversation with the individuals that she interviewed.

⁷¹⁰ Conversation with Senator Rubio’s staff, December 16, 2021.

⁷¹¹ Markson, p. 15-17. The doctor’s identity must be protected for obvious personal safety reasons. Senator Rubio’s staff was unable to corroborate this particular account as a result.

⁷¹² See “Hubei Provincial Development and Reform Commission Opinion and Work Notice Concerning the Implementation of the Strategy to Accelerate the Rise of the Central Region and Promote High-Quality Development” (省发展改革委关于落实促进中部地区崛起战略推动高质量发展意见工作的通知), *Hubei Provincial People’s Government* (Online), 29 November 2019. Note: the directive was approved on November 1, but not publicized until November 29.

⁷¹³ Ibid. The quoted text is “加强关键领域自主创新。”

⁷¹⁴ Ibid. Emphasis added. The quoted text is “保障武汉国家生物安全实验室高效安全运行。积极推进东湖实验室建设。”

⁷¹⁵ The Office of the Spokesperson of the U.S. Department of State, “Fact Sheet: Activity at the Wuhan Institute of Virology,” *U.S. Department of State* (Online), 15 January 2021.

⁷¹⁶ Michael R. Gordon, Warren P. Strobel, and Drew Hinshaw, “Intelligence on Sick Staff at Wuhan Lab Fuels Debate on Covid-19 Origin,” *The Wall Street Journal*, 23 May 2021.

⁷¹⁷ John Sexton, “Josh Rogin: The Sick Researchers from the Wuhan Institute of Virology Lost their Sense of Smell,” *Hot Air*, 23 August 2021; and Honestly with Bari Weiss, “You’re Already Living in China’s World Pt 1: The Lab Leak Lies,” *Apple Podcasts*, 23 August 2021.

⁷¹⁸ Ibid.

⁷¹⁹ “PCR Purchasing Report Wuhan China,” Internet 2.0 Relentless Security, October 2021, p. 9. Jamie Tarabay, “Bloomberg Government: China PCR Purchases Increased Before First Known Covid Cases,” *Bloomberg Government*, 04 October 2021.

⁷²⁰ Ashley Hagan, “COVID-19 and the Flu,” *American Society for Microbiology* (Online), 07 October 2021.

⁷²¹ “The Use of PCR in the Surveillance and Diagnosis of Influenza,” *World Health Organization* (Online), Report of the 4th meeting of the WHO working group on polymerase chain reaction protocols for detecting subtype influenza A viruses, Geneva, Switzerland, 14–15 June 2011.

⁷²² Jamie Tarabay, “Bloomberg Government: China PCR Purchases Increased Before First Known Covid Cases,” *Bloomberg Government*, 04 October 2021.

⁷²³ “School of Life Sciences Holds Drills for Fire Prevention Evacuation and Leak of Hazardous Waste,” (生命科学学院举行消防疏散和危废泄漏演练), *Peking University School of Life Sciences* (Online), 08 November 2019.

⁷²⁴ Ibid. The quoted Chinese terms are “危废泄漏” and “生物培养基泄漏事故.”

⁷²⁵ “Keep Firmly in Mind Your Responsibilities, Hold Fast to the Mission, Be a Pioneer for our Nation in the Realm of High-Level Biosafety – The Achievements of the Zhengdian Lab Party Branch of the Chinese Academy of Sciences Wuhan Institute of Virology (牢记责任，坚守使命 做我国高等级生物安全领域的开拓者——中科院武汉病毒所郑店实验室党支部事迹), *Wuhan Institute of Virology* (Online), 12 November 2019.

⁷²⁶ Ibid. The party branch had 17 members at the BSL-4 lab alone, 7 of whom were associate senior researchers or higher, with an average age of 35. The quoted text is “是一支年轻有干劲的队伍.”

⁷²⁷ Ibid. The quoted text is “实现党建工作全覆盖.”

⁷²⁸ Ibid. Emphasis added. The quoted text is “郑店实验室党支部非常重视解决进口关键核心设备‘卡脖子’问题，通过组织关键核心设备的管理交流会，由各核心设备管理人员从设备的结构组成、工作原理、逻辑控制等方面进行介绍，大家就所关心设备的技术、生物安全、使用程序等问题进行充分讨论，不断克服技术障碍.”

⁷²⁹ “Wuhan Institute of Virology Party Committee Convenes Central Group Plenary Study Session” (武汉病毒所党委召开中心组（扩大）学习会议), *Wuhan Institute of Virology* (Online), 12 September 2018.

⁷³⁰ “Wuhan Branch Opens Fourth Quarter Party Building Work Advancement Meeting” (武汉分院召开第四季度党建工作推进会), *Wuhan Branch of the Chinese Academy of Sciences* (Online), 26 December 2018.

⁷³¹ See “Xiang Shuilun Examines the Wuhan Institute of Virology’s Work of Establishing a ‘Red Flag Party Branch’” (项水伦考核武汉病毒所“红旗党支部”创建工作), *Wuhan Institute of Virology* (Online), 11 June 2019; “Wuhan Institute of Virology Convenes Promotion Meeting for Work on the Educational Theme of ‘Staying True to our Original Aspiration, Keeping Firmly in Mind our Mission’ and a Study Session of the Expanded Party Committee Central Group” (武汉病毒所召开“不忘初心，牢记使命”主题教育工作推进会暨党委中心组（扩大）学习会议), *Wuhan Institute of Virology* (Online), 21 June 2019; and “Wuhan Institute of Virology’s Zhengdian Laboratory Party Branch is Awarded with Honorary Title of ‘Red Flag Party Branch’ from Hubei Provincial Work Committee for Directly Subordinate Organizations” (武汉病毒所郑店实验室党支部荣获湖北省直机关工委“红旗党支部”荣誉称号), *Wuhan Institute of Virology* (Online), 01 July 2019.

⁷³² “Wuhan Institute of Virology Convenes Study by the Party Committee’s Plenary Central Group and Special Investigation and Study Meeting of the Educational Theme ‘Never Forgetting our Original Aspiration and Keeping Firmly in Mind our Mission’” (武汉病毒所召开党委扩大中心组学习暨“不忘初心，牢记使命”主题教育专题调研会议), *Wuhan Institute of Virology* (Online), 30 July 2019.

⁷³³ The quoted text is “习近平总书记强调，‘关键核心技术是国之重器’，” and “习近平总书记指出，‘P4 实验室建设对中国公共卫生至关重要’。” See, “Keep Firmly in Mind Your Responsibilities, Hold Fast to the Mission, Be a Pioneer for our Nation in the Realm of High-Level Biosafety – The Achievements of the Zhengdian Lab Party Branch of the Chinese Academy of Sciences Wuhan Institute of Virology (牢记责任，坚守使命 做我国高等级生物安全领域的开拓者——中科院武汉病毒所郑店实验室党支部事迹), *Wuhan Institute of Virology* (Online), 12 November 2019.

⁷³⁴ The quoted text is “习近平总书记指出，‘我国面临的很多卡脖子技术问题，根子是基础理论研究跟不上，源头和底层的東西没有搞清楚’。” See Hou Jianguo (侯建国), “Make Science and Technology Self-Reliance and Self-

Improvement the Strategic Support for National Development” (把科技自立自强作为国家发展的战略支撑), *Wuhan Branch of the Chinese Academy of Sciences* (Online), 17 March 2021.

⁷³⁵ See the official website of the Shenzhen Institute of Synthetic Biology at <http://www.isynbio.org/research-center.aspx>. Its purpose is described thusly: “The Research and Development Center for Key Equipment in Synthetic Biology is dedicated to solving the ‘stranglehold’ problem of key common technologies and tools in synthetic biology, developing key technologies for de novo DNA synthesis and developing independently patented high-performance DNA synthesizers, and promoting the rapid development of the synthetic biology research and industry.” The Chinese text is “合成生物关键设备研发中心致力于解决合成生物学关键共性技术与工具的“卡脖子”问题，开展DNA从头合成关键技术研发和自主知识产权高性能DNA合成仪研制，推动合成生物学科研与产业的快速发展。”

⁷³⁶ Emphasis added. The quoted text is “由于P4实验室的研究对象是高致病性病原微生物，在实验室里，一旦打开了保存病毒的试管，犹如打开了潘多拉魔盒，这些病毒来无影去无踪，虽有各种防护措施，但仍然需要实验人员小心翼翼的操作，避免由于操作失误而造成危险。每当这时，郑店实验室党支部党员总是冲在第一线，他们用实际行动带动和感染着实验室其他人员。” See, “Keep Firmly in Mind Your Responsibilities, Hold Fast to the Mission, Be a Pioneer for our Nation in the Realm of High-Level Biosafety – The Achievements of the Zhengdian Lab Party Branch of the Chinese Academy of Sciences Wuhan Institute of Virology (牢记责任，坚守使命 做我国高等级生物安全领域的开拓者——中科院武汉病毒所郑店实验室党支部事迹), *Wuhan Institute of Virology* (Online), 12 November 2019.

⁷³⁷ Ibid. Emphasis added. The quoted text is “在实验室里，他们常常需要连续工作4个小时，甚至长达6小时，期间不能饮食，排泄，这对人的意志和体力是极大的考验。这不仅要求实验人员要具备熟练的操作技能，还要具备应对各种意外情况的能力。” Note that the word translated here as “unexpected” (意外) can also refer to an “accident” or “mishap” when used as a noun.

⁷³⁸ Ibid. The quoted text is “不要将工作任务看作压力，每一个任务都是你不断提升自我的机遇和阶梯。我们这个团队的理念是吃亏是福...”

⁷³⁹ Ibid. The quoted text is “武汉P4实验室在建设伊始面临着无设备和技术标准、无设计和建设团队、无运维经验的“三无”困境，经过郑店实验室党支部的党员带头攻坚克难、奋勇向前，最终实现了即有完善的标准体系、有精良的运维团队、有宝贵的建设经验的“三有。”

⁷⁴⁰ See “Xiang Shuilun Examines the Wuhan Institute of Virology’s Work of Establishing a ‘Red Flag Party Branch’” (项水伦考核武汉病毒所“红旗党支部”创建工作), *Wuhan Institute of Virology* (Online), 11 June 2019.

⁷⁴¹ The quoted text is “实验室党员首先想到的就是设备安。” See, “Keep Firmly in Mind Your Responsibilities, Hold Fast to the Mission, Be a Pioneer for our Nation in the Realm of High-Level Biosafety – The Achievements of the Zhengdian Lab Party Branch of the Chinese Academy of Sciences Wuhan Institute of Virology (牢记责任，坚守使命 做我国高等级生物安全领域的开拓者——中科院武汉病毒所郑店实验室党支部事迹), *Wuhan Institute of Virology* (Online), 12 November 2019.

⁷⁴² Ibid.

⁷⁴³ Ibid. Emphasis added. The quoted text is “经过对进口设备的消化吸收再创新，使实验室建设满足国内和国际标准、法国设计理念符合中国建筑要求等。”

⁷⁴⁴ Emphasis added. Ibid. The quoted text is “例如，实验室核心区域的围护结构，实验室团队通过反复测试，用先进的激光焊接方式替代了传统的胶密封方式，具有更好的气密性和耐久的效果，P4团队拥有该技术的自主知识产权；自主设计自动控制的数学模型，达到更稳定的压差控制效果等。”

⁷⁴⁵ “Keep Firmly in Mind Your Responsibilities, Hold Fast to the Mission, Be a Pioneer for our Nation in the Realm of High-Level Biosafety – The Achievements of the Zhengdian Lab Party Branch of the Chinese Academy of Sciences Wuhan Institute of Virology (牢记责任，坚守使命 做我国高等级生物安全领域的开拓者——中科院武汉病毒所郑店实验室党支部事迹), *Chinese Academy of Sciences Party Building* (科苑党建), 30 August 2019.

⁷⁴⁶ The quoted text is “他们建设并运行着我国首个P4实验室，这个拥有最先进防护设备，生物安全等级最高的实验室。” See, “Keep Firmly in Mind Your Responsibilities, Hold Fast to the Mission, Be a Pioneer for our Nation in the Realm of High-Level Biosafety – The Achievements of the Zhengdian Lab Party Branch of the Chinese Academy of Sciences Wuhan Institute of Virology (牢记责任，坚守使命 做我国高等级生物安全领域的开拓者——中科院武汉病毒所郑店实验室党支部事迹), *Wuhan Institute of Virology* (Online), 12 November 2019.

⁷⁴⁷ Ibid. The relevant text is “在该建设团队中, 共有副高级及以上技术人员 7 人, 全部为中共党员.”

⁷⁴⁸ Jasper Becker, *Made in China: Wuhan, Covid, and the Quest for Biotech Supremacy*, (London: C. Hurst & Co. Ltd., 2021), p. 218.

⁷⁴⁹ The change in Chinese was from “由于安全要求, 武汉 P4 实验室的实验人员...” to “P4 实验室由于安全要求, 实验人员...” For comparison, see “Keep Firmly in Mind Your Responsibilities, Hold Fast to the Mission, Be a Pioneer for our Nation in the Realm of High-Level Biosafety – The Achievements of the Zhengdian Lab Party Branch of the Chinese Academy of Sciences Wuhan Institute of Virology (牢记责任, 坚守使命 做我国高等级生物安全领域的开拓者—中科院武汉病毒所郑店实验室党支部事迹), *Chinese Academy of Sciences Party Building* (科苑党建), 30 August 2019; and “Keep Firmly in Mind Your Responsibilities, Hold Fast to the Mission, Be a Pioneer for our Nation in the Realm of High-Level Biosafety – The Achievements of the Zhengdian Lab Party Branch of the Chinese Academy of Sciences Wuhan Institute of Virology (牢记责任, 坚守使命 做我国高等级生物安全领域的开拓者—中科院武汉病毒所郑店实验室党支部事迹), *Wuhan Institute of Virology* (Online), 12 November 2019.

⁷⁵⁰ Ibid. Emphasis added. The August version read: “由于武汉 P4 实验室的研究对象是高致病性病原微生物...” whereas the November version read: “由于 P4 实验室的研究对象是高致病性病原微生物...”

⁷⁵¹ Ibid. The August version read: “经过对进口设备的消化吸收再创新, 使实验室建设满足国内和国际标准.” Full stop. The November version kept that sentence in full, but replaced the period with a comma and added “法国设计理念符合中国建筑要求等.”

⁷⁵² Ibid. The relevant Chinese text is “例如, 实验室核心区域的围护结构, 实验室团队通过反复测试, 用先进的激光焊接方式替代了传统的胶密封方式, 具有更好的气密性和耐久的效果, P4 团队拥有该技术的自主知识产权; 自主设计自动控制的数学模型, 达到更稳定的压差控制效果等.”

⁷⁵³ Ibid. The August version read: “由于武汉 P4 实验室的研究对象是高致病性病原微生物, 因此在实验室里, 一旦打开保存病毒的试管, 就如同打开了“潘多拉魔盒.” 每当这时, 郑店实验室党支部党员总是冲在第一线, 用实际行动带动和感染着实验室其他人员.” The November text, by contrast, read: “由于 P4 实验室的研究对象是高致病性病原微生物, 在实验室里, 一旦打开了保存病毒的试管, 犹如打开了潘多拉魔盒, 这些病毒来无影去无踪, 虽有各种防护措施, 但仍然需要实验人员小心翼翼的操作, 避免由于操作失误而造成危险. 每当这时, 郑店实验室党支部党员总是冲在第一线, 他们用实际行动带动和感染着实验室其他人员.”

⁷⁵⁴ Josephine Ma, “Coronavirus: China’s First Confirmed Covid-19 Case Traced Back to November 17,” *South China Morning Post*, 13 March 2020.

⁷⁵⁵ Ibid. Emphasis added.

⁷⁵⁶ Ibid. For a fuller analysis of the significance of Ma’s reporting, see Daniel R. Lucey, “Will the China report on 266 patients Nov. 17-Dec. 31, 2019 be made public by China, WHO, or by WHA resolution next week?,” *Infectious Diseases Society of America* (Online), 20 May 2021.

⁷⁵⁷ “WHO-Convended Global Study of Origins of SARS-CoV-2: China Part,” Joint WHO-China Study: 14 January to 10 February 2021, *World Health Organization* (Online), 30 March 2021, p. 7.

⁷⁵⁸ Josephine Ma, “Coronavirus: China’s First Confirmed Covid-19 Case Traced Back to November 17,” *South China Morning Post*, 13 March 2020.

⁷⁵⁹ The researcher was Dr. Steven Quay. For a transcript of his comments, see David Asher, “Transcript: Uncovering the Origins of COVID-19: A Scientific Discussion,” *the Hudson Institute* (Online), 16 June 2021; and Melissa Wilson, “Researcher Traces Origin of COVID-19,” *FOX 25 Houston*, 04 January 2021.

⁷⁶⁰ Ibid.

⁷⁶¹ Ian Birrell, “Is ‘Patient Su’ Covid’s Patient Zero?” *The Daily Mail*, 29 May 2021.

⁷⁶² The quoted text is “11 月有两个患者病例, 发病时间分别是 2019 年 11 月 14 日和 11 月 21 日... 一位 11 月底发病患者, 12 月 2 号住院, 临床诊断为肺炎.” See Wang Zhenya, “Expert Assesses the Source of the Novel Coronavirus: December 8 of Last Year May Not be the Earliest Time of Onset,” (专家研判新冠源头: 去年 12 月 8 日或许不是最早发病时间), *Health Times* (健康时报网), 27 February 2020.

⁷⁶³ See “Wuhan Institute of Virology Launches Training on Safety Work” (武汉病毒所开展安全工作培训), *Wuhan Institute of Virology* (Online), 21 November 2019.

⁷⁶⁴ Ibid. Note the official’s name in Chinese is 汲长征. The Chinese title of his report was “中国科学院安全工作形势与任务,” and “specially invited” is “特邀.”

⁷⁶⁵ Ibid. Emphasis added. The quoted text is “汲长征传达了党中央、国务院关于安全工作的指示要求，重点宣贯了习近平总书记、李克强总理关于安全工作的重要论述和重要批示。同时，结合近些年国内外多次大型安全事故案例，从责任担当、操作规范、应急预案、隐患排查等方面展开多层次多角度深入剖析，生动展现出目前安全工作所面临的复杂、严峻形势。最后，汲长征针对中科院实际情况，就实验室安全、科技安全、学生安全、园区安全及网络安全等安全管理工作中存在的普遍问题进行了归纳和分析。”

⁷⁶⁶ For more information on the *pishi* system, see Wen-Hsuan Tsai and Xingmiu Liu, “Concentrating Power to Accomplish Big Things: The CCP’s Pishi System and Operation in Contemporary China,” *Journal of Contemporary China*, 26 (104), September 2016, p. 1-14; and Wen-Hsuan Tsai, “A Unique Pattern of Policymaking in China’s Authoritarian Regime: The CCP’s Neican/Pishi Model,” *Asian Survey*, Vol. 55, No. 6, University of California Press: November/December 2015, pp. 1093-1115. A note on the translation of 批示 and 指示 is warranted. *Pishi* is a well-established system for written orders/instructions/directives in the CCP. *Zhishi*, by contrast, is a much more general term that means “instructions” or “directives.” When paired with *pishi*, we translate *zhishi* as “oral instructions” because we understand it to refer to orders handed down outside of the *pishi* system, such as in a speech or at a meeting, which is usually done orally. Strictly speaking, the word *zhishi* itself does not spell out the mode of transmission for the instructions. It is ambiguous. Sometimes CCP officials, including Xi, explicitly say “oral instructions” (口头指示), and at other times they just say “instructions” (指示), but again, the oral nature of the transmission is implied when paired with *pishi*, which is always written.

⁷⁶⁷ Emphasis added. The quoted text is “提出做好安全管理工作一是要强化认识，提高政治站位；二是要明晰权责，推动责任落实；三是要统筹协调，强化管控治理；四是要加强科技安全风险研究和预警监测体系建设。安全管理人员要强化使命担当，夯实责任，齐心共筑科研发展的安全屏障...” See, “Wuhan Institute of Virology Launches Training on Safety Work” (武汉病毒所开展安全工作培训), *Wuhan Institute of Virology* (Online), 21 November 2019.

⁷⁶⁸ The Chinese quote is “要加快科技安全预警监测体系建设。” See, “Xi Jinping: Be on Guard against ‘Black Swan’ Incidents, Prevent ‘Grey Rhinos,’” (习近平：警惕“黑天鹅”防范“灰犀牛”), *the People’s Daily*, 22 January 2019.

⁷⁶⁹ “Xi Jinping Delivers Important Speech at the Opening Ceremony of the Central Party School’s (Chinese Academy of Governance) Young Cadres Training Class” (习近平在中央党校（国家行政学院）中青年干部培训班开班式上发表重要讲话), *Xinhua News Agency* re-posted on the *Central Government of the People’s Republic of China* (Online), 03 September 2019.

⁷⁷⁰ Emphasis added. The quoted text is “培训会上，武汉病毒所安保办副主任胡谦总结了过去一年安全检查过程中发现的若干共性问题，指出安全隐患可能引发的严重后果，强调隐患整改要彻底，规范管理要保持。” See, “Wuhan Institute of Virology Launches Training on Safety Work” (武汉病毒所开展安全工作培训), *Wuhan Institute of Virology* (Online), 21 November 2019.

⁷⁷¹ Ibid. The quoted text is “加强安全法规、规章制度宣贯，进一步完善操作流程，防范各类安全风险，保障研究所科研生产安全。”

⁷⁷² See, “Central Committee No. 15 Patrol Inspection Group Opens Meeting on the Inspection of the Party Organization of the Chinese Academy of Sciences and its Mobilization Work” (中央第十五巡视组巡视中国科学院党组工作动员会召开), *China Science Daily* as reprinted on the *Chinese Academy of Sciences* (Online), 16 September 2019.

⁷⁷³ “Institute of Botany Holds 2019 Annual Safety Training” (植物所举办 2019 年度安全培训), *Chinese Academy of Sciences* (Online), 14 November 2019.

⁷⁷⁴ “The Chinese Academy of Sciences’ 2019 Training for Management Cadres at Subordinate Work Units on Internet Security and Informatization is Held in Urumqi” (中科院 2019 年院属单位网络安全和信息化主管干部培训班在乌鲁木齐举办), *Chinese Academy of Sciences* (Online), 30 August 2019; Security Office for Chinese Academy of Sciences General Office Arrives at Kashgar Station for Safety Inspection Work” (中科院办公厅科安处到喀什站检查安全工作), *Chinese Academy of Sciences* (Online), 05 September 2019.

⁷⁷⁵ “Wuhan Institute of Virology Convenes 2019 Security Work Conference” (武汉病毒所召开 2019 年度安全工作会议), *Wuhan Institute of Virology* (Online), 08 April 2019.

⁷⁷⁶ See, “Inter-Departmental Joint Theoretical Study Session Discusses Work in 2017” (处际联席务虚会共同研讨 2017 年工作), *Chinese Academy of Sciences* (Online), 14 February 2017; “Training for Tibet Network and

Telecommunications Cadres Begins” (西藏网信干部业务培训班正式开班), *Chinese Academy of Sciences Institute of Computing Technology* (Online), 23 May 2018; “Computing and Network Information Center Organizes Conference on the Implementation and Planning for System to Pilot Nex-Generation ARP” (计算机网络信息中心组织召开新一代 ARP 试点系统实施工作部署会议), *Chinese Academy of Sciences Computing and Network Information Center* (Online), 24 July 2018; “Research Center for Eco-Environmental Sciences Convenes 2020 Annual Safety Personnel Meeting” (生态环境研究中心召开 2020 年度安全员工作会议), *CAS Research Center for Eco-Environmental Sciences* (Online), 14 January 2019; “Chinese Academy of Sciences Secretary-General Deng Maicun Leads a Team to the Technical Institute of Physics and Chemistry to Inspect Safety Work” (中科院秘书长邓麦村带队来理化所检查安全工作), *Chinese Academy of Sciences Technical Institute of Physics and Chemistry* (Online), 16 January 2019; “Beijing Branch of CAS Convenes 2019 Annual Outdoor Field Station Safety Management Work Professional Training” (北京分院召开 2019 年度野外台站安全管理工作业务培训班) *Beijing Branch of Chinese Academy of Sciences* (Online), 15 October 2019; “Institute of Botany Holds 2019 Annual Safety Training” (植物所举办 2019 年度安全培训), *Chinese Academy of Sciences* (Online), 14 November 2019.

⁷⁷⁷ “Nanjing Branch of CAS Convenes 2019 Safety Work Conference” (南京分院召开 2019 年安全工作会议), *Nanjing Branch of the Chinese Academy of Sciences* (Online), 24 May 2019.

⁷⁷⁸ “Chinese Academy of Sciences Western Region Convenes 18th Safe Research Meeting in Chongqing” (中科院西部地区第十八届安研会在渝召开), *CAS Chongqing Institute of Green and Intelligent Technology* (Online), 28 May 2019.

⁷⁷⁹ “Guangzhou Branch of CAS Convenes 2019 Conference on Safety and Protecting Secret Information” (广州分院召开 2019 年安全保密工作会议), *Chinese Academy of Sciences* (Online), 17 May 2019.

⁷⁸⁰ “The Chinese Academy of Sciences’ 2019 Training for Management Cadres at Subordinate Work Units on Internet Security and Informatization is Held in Urumqi” (中科院 2019 年院属单位网络安全和信息化主管干部培训班在乌鲁木齐举办), *Chinese Academy of Sciences* (Online), 30 August 2019.

⁷⁸¹ “Security Office for Chinese Academy of Sciences General Office Arrives at Kashgar Station for Safety Inspection Work” (中科院办公厅科安处到喀什站检查安全工作), *Chinese Academy of Sciences* (Online), 05 September 2019.

⁷⁸² Zhu Huiqiao (朱卉乔), “Chinese Academy of Sciences 2019 Training for Management Cadres at Subordinate Work Units for Safety Management is Held in Hefei” (中国科学院 2019 年度院属单位安全管理干部培训在合肥举办), *Chinese Academy of Sciences* (Online), 12 September 2019.

⁷⁸³ “Shenyang Branch of CAS Convenes 2021 Annual Safety Work Conference” (2021 年安全工作会议), *Shenyang Branch of the Chinese Academy of Sciences* (Online), 27 May 2021; “Shenyang Branch of CAS Convenes 2022 Safety Work Conference” (沈阳分院召开 2022 年安全工作会议), *Shenyang Branch of the Chinese Academy of Sciences* (Online), 09 June 2022.

⁷⁸⁴ “Changchun Branch of CAS Organizes and Convenes 2022 Annual Safety Work Conference” (长春分院组织召开 2022 年度安全工作会议), *Chinese Academy of Sciences Changchun Branch* (Online), 01 June 2022.

⁷⁸⁵ “Ningbo Institute of Materials Technology and Engineering Convenes Conference on Analyze Trend Analysis of Safety Work During the First Half of 2022” (宁波材料所召开 2022 年上半年安全形势分析会), *Ningbo Institute of Materials Technology and Engineering* (Online), 14 July 2022.

⁷⁸⁶ “Shanghai Institute of Ceramics Convenes Summer Session of Production Safety Conference” (上海硅酸盐所召开夏季安全生产会议), *Shanghai Institute of Ceramics* (Online), 05 September 2022.

⁷⁸⁷ The relevant text from which the quote was taken is “深入贯彻落实习近平总书记治边稳藏和发展网络强国重要战略思想, 特别是打造一支过硬的网信队伍批示精神.” See, “Training for Tibet Network and Telecommunications Cadres Begins” (西藏网信干部业务培训班正式开班), *Chinese Academy of Sciences Institute of Computing Technology* (Online), 23 May 2018.

⁷⁸⁸ Emphasis added. The quoted text is “学习传达习近平总书记关于安全稳定工作的重要指示批示精神.” “Changchun Branch of CAS Organizes and Convenes 2022 Annual Safety Work Conference” (长春分院组织召开 2022 年度安全工作会议), *Chinese Academy of Sciences Changchun Branch* (Online), 01 June 2022.

⁷⁸⁹ Emphasis added. The quoted text is “习近平总书记关于安全生产的重要指示批示精神.” “Shenyang Branch of CAS Convenes 2022 Safety Work Conference” (沈阳分院召开 2022 年安全工作会议), *Shenyang Branch of the Chinese Academy of Sciences* (Online), 09 June 2022; “Ningbo Institute of Materials Technology and Engineering Convenes

Conference on Analyze Trend Analysis of Safety Work During the First Half of 2022” (宁波材料所召开 2022 年上半年安全形势分析会), *Ningbo Institute of Materials Technology and Engineering* (Online), 14 July 2022.

⁷⁹⁰ See “Xi Jinping: Speech to the Chinese Academy of Sciences’ 19th Plenary Meeting of Academicians and the Chinese Academy of Engineering’s 14th Plenary Meeting of Academicians” (习近平：在中国科学院第十九次院士大会、中国工程院第十四次院士大会上的讲话), *Xinhua News Agency*, 28 May 2018.

⁷⁹¹ “The Party Organization of the Chinese Academy of Sciences Studies and Carries Out General Secretary Xi Jinping’s Important Speeches, Written Instructions, and Oral Instructions on the Work of the CAS” (中科院党组学习贯彻习近平总书记关于中科院工作重要讲话批示指示), *Chinese Academy of Sciences* (Online), 01 September 2017.

⁷⁹² Ibid. Here is an illustrative example from the text: “习近平总书记的重要讲话批示指示充分肯定了中科院科技创新取得的丰硕成果,充分体现了党中央对中科院这支国家战略科技力量的高度重视,充分信任,殷切厚望和莫大鞭策。”

⁷⁹³ The quoted text is extracted from the following sentence: “为了贯彻落实国务院领导同志关于北京交通大学“12.26”实验室爆炸事故重要指示批示精神。” See, “Circular Regarding Going a Step Further to Strengthen Safety Inspection Work for Teaching Laboratories at Institutions of Higher Learning” (教育部办公厅关于进一步加强高校教学实验室安全检查工作的通知), *PRC Ministry of Education* (Online), 10 January 2019.

⁷⁹⁴ Josh Chin, “Xi Jinping’s Leadership Style: Micromanagement that Leaves Underlings Scrambling,” *The Wall Street Journal*, 15 December 2021.

⁷⁹⁵ Nis Grunberg and Katja Drinhausen, “The Party Leads on Everything: China’s Changing Governance in Xi Jinping’s New Era,” *Mercator Institute of China Studies* (Online), 24 September 2019; Cai Xia, “The Weakness of Xi Jinping: How Hubris and Paranoia Threaten China’s Future,” *Foreign Affairs*, September/October 2022.

⁷⁹⁶ Richard McGregor, *Xi Jinping: The Backlash*, Penguin Random House Books: Sydney, Australia, 16 July 2019.

⁷⁹⁷ See, “Wuhan Institute of Virology Holds 2019 Training Class on Biosafety Laboratory Management and Techniques for Conducting Experiments” (武汉病毒所举办 2019 年生物安全实验室管理与实验技术培训班), *Wuhan Institute of Virology* (Online), 28 November 2019.

⁷⁹⁸ Ibid. The characters for Zhao’s name are 赵赤鸿.

⁷⁹⁹ Ibid. The quoted text is “课程内容涵盖了国家生物安全法律法规及标准,高等级生物安全实验室管理体系,实验室生物安全风险评估方法,菌毒种保藏,动物实验以及实验室废弃物处理等内容。”

⁸⁰⁰ Connor Reed, “What it’s REALLY like to catch coronavirus: First British victim, 25, describes how ‘worst disease he ever had’ left him sweating, shivering, and struggling to breathe as his eyes burned and bones ached,” *The Daily Mail*, 04 March 2020. Ben Dangerfield, “Briton Struck with Coronavirus in Wuhan Recalls: ‘I Couldn’t Get Enough Air’,” *Reuters*, 11 March 2020.

⁸⁰¹ Connor Reed, “What it’s REALLY like to catch coronavirus: First British victim, 25, describes how ‘worst disease he ever had’ left him sweating, shivering, and struggling to breathe as his eyes burned and bones ached,” *The Daily Mail*, 04 March 2020.

⁸⁰² Ellena Cruse, “First British person with coronavirus reveals agony of contracting illness,” *The Evening Standard*, 05 March 2020; Laura Clements, “Parents of Welsh Student who was First Known Brit to have Covid Unable to go to his Funeral,” *Wales Online*, 07 November 2020.

⁸⁰³ The PLA AMMS authors were Zhou Yusen (周育森), Sun Shihui (孙世惠), He Lei (何雷), and Chen Yuehong. Fang Li, et. al., “Molecular Mechanism for Antibody-Dependent Enhancement of Coronavirus Entry,” *Journal of Virology*, 2020 March; 94(5): e02015-19, published online 14 February 2020, submitted on 27 November 2019.

⁸⁰⁴ Ibid.

⁸⁰⁵ Ibid.

⁸⁰⁶ “Notice on the Work Situation for the Handling of the Lanzhou Veterinary Research Institute Incident of Positive Cases for Brucella Antibodies” (兰州兽研所布鲁氏菌抗体阳性时间处置工作情况通报) *Lanzhou Municipal Health Commission* (Online), 15 September 2020. Jessie Yeung and Eric Cheung, “Bacterial Outbreak Infects Thousands after Factory Leak in China,” *CNN*, 17 September 2020. Liangping Gao and Ryan Woo, “Over 6,000 people in China’s Lanzhou test positive for brucellosis - state media,” *Reuters*, 05 November 2020. Liangping Gao and Ryan Woo, “Explainer: How Thousands in China got Infected by Brucellosis in One Single Outbreak,” *Reuters*, 05 November 2020.

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⁸⁰⁹ For examples of official statements and reporting that do not refer to the brucella incident as a “leak” or “laboratory” associated incident, see “Notice on the Work Situation for the Handling of the Lanzhou Veterinary Research Institute Incident of Positive Cases for Brucella Antibodies” (兰州兽研所布鲁氏菌抗体阳性时间处置工作情况通报) *Lanzhou Municipal Health Commission* (Online), 15 September 2020. “Brucella Cases Caused by Contaminated Factory Exhaust: Report,” *Xinhua*, 27 December 2019. “337 Personnel who Tested Positive for Brucella in Lanzhou Have Already Received Compensation,” (兰州已有 337 名布鲁氏菌抗体阳性人员获得赔偿), *Xinhua News Agency*, 05 November 2020. Ren Mengyan (任梦岩), “Punishments Announced for 2019 ‘Lanzhou Brucella Incident,’ Work Related to the Aftermath Launched in Groups” (2019 年 “兰州布病事件” 处罚结果公布相关善后工作分批开展), *CCTV*, 17 September 2020.

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⁸¹⁵ *Ibid.* See Figure 1.

⁸¹⁶ *Ibid.*

⁸¹⁷ *Ibid.*

⁸¹⁸ For more information on how the CCP controls information, see David Bandurski, “Taming the Flood: How China’s Leaders ‘Guide’ Public Opinion,” *ChinaFile*, 20 July 2015; Gary Rawnsley, “Why China’s Propagandists Love the Internet,” *Foreign Policy*, 21 July 2015; and David Bandurski, “Guidance of Public Opinion,” *China Media Project*, 14 April 2020.

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⁸²⁰ “WHO-Convended Global Study of Origins of SARS-CoV-2: China Part,” Joint WHO-China Study: 14 January to 10 February 2021, *World Health Organization* (Online), 30 March 2021, p. 119.

⁸²¹ DRASTIC Research Group, “Wuhan Laboratories, Bat Research, and Biosafety,” Research Gate, April 2021, p. 25.

⁸²² “WHO-Convended Global Study of Origins of SARS-CoV-2: China Part,” Joint WHO-China Study: 14 January to 10 February 2021, *World Health Organization* (Online), 30 March 2021, p. 119.

⁸²³ DRASTIC Research Group, “Wuhan Laboratories, Bat Research, and Biosafety,” Research Gate, April 2021, p. 27-29.

⁸²⁴ Eva Dou and Lily Kuo, “A Scientist Adventurer and China’s ‘Bat Woman’ are Under Scrutiny as Coronavirus Lab-Leak Theory Gets Another Look,” *The Washington Post*, 03 June 2021

⁸²⁵ The document number was ZB0109-1912-ZCHW1288. See, “Announcement of Sole Source Procurement Order for Air Incinerator Device and Testing Services for the Chinese Academy of Sciences Wuhan Institute of Virology” (中国科学院武汉病毒研究所采购空气焚烧装置以及测试服务项目拟采用单一来源采购方式公示), *Chinese*

Government Procurement Network (中国政府采购网), 03 December 2019. Thanks to the DRASTIC Research Group for locating and archiving this document. <https://archive.ph/Jifqr>

⁸²⁶ The document number was ZB0109-1912-ZCFW1353. The quoted text is “锅炉房 (含) 至 P4 分汽缸出口之间所属热力系统设施的营运, 维护, 年检等.” See, “Announcement Seeking Inquires for Complete Commissioning of the Operation and Management of the Boiler Room at the Zhengdian Campus of the Chinese Academy of Sciences Wuhan Institute of Virology” (中国科学院武汉病毒研究所郑店园区锅炉房全委托运营管理项目询价公告), *Chinese Government Procurement Network* (中国政府采购网), 16 December 2019. Thanks to the DRASTIC Research Group for locating and archiving this document. <https://archive.ph/QfGR8#selection-149.0-152.0>

⁸²⁷ Ibid.

⁸²⁸ Wen Jun (文俊), “Xiao Juhua Stresses All-Out Support for Construction of Center for Biosafety Mega-Science” (肖菊华强调全力支持建设生物安全大科学中心), *Hebei Daily* reprinted on *Hubei Provincial People's Government* (Online), 07 December 2019.

⁸²⁹ Ibid. The quoted text is “肖菊华考察了武汉国家生物安全实验室 (P4 实验室), 详细了解其建设历程, 研究现状与发展方向等, 就有关支持事项进行现场办公。”

⁸³⁰ Ibid. The quoted text is “她指出, 武汉 P4 实验室地位重大、作用重大, 关乎国家安全、社会稳定和人民健康, 是创建武汉综合性国家科学中心的重要基础, 是湖北生物医药健康产业发展的重要支撑。”

⁸³¹ Emphasis added. Rob van Hattum (Director), “Virologists on the Coronavirus Outbreak,” *VPRO Documentary “Backlight” (Tegenlicht) Program*, 27 May 2020, [Note: Quote begins at 1:59], <https://www.youtube.com/watch?v=5DeUBLmNjY>

⁸³² Denise Grady and Donald G. McNeil Jr., “Debate Persists on Deadly Flu Made Airborne,” *The New York Times*, 26 December 2011; and Martin Enserink, “Flu Researcher Ron Fouchier Loses Legal Fight Over H5N1 Studies,” *Science Magazine*, 25 September 2013; and Jocelyn Kaiser, “Controversial Experiments that Could Make Bird Flu More Risky Poised to Resume,” *Science Magazine*, 08 February 2019.

⁸³³ See, Jane Qiu, “How China’s ‘Bat Woman’ Hunted Down Viruses from SARS to the New Coronavirus,” *Scientific American*, 11 March 2020.

⁸³⁴ The media outlet is called 科普中国 in Chinese. The documentary was called “旷野青春 | 隐形防线.” It can be viewed here: <https://www.youtube.com/watch?v=ovnUyTRMERI>

⁸³⁵ Eva Dou and Lily Kuo, “A Scientist Adventurer and China’s ‘Bat Woman’ are Under Scrutiny as Coronavirus Lab-Leak Theory Gets Another Look,” *The Washington Post*, 03 June 2021; and Aylin Woodward, “A 2019 Video Shows Scientists from the Wuhan CDC Collecting Samples in Bat Caves — But the Agency Hasn’t Revealed any Findings,” *Business Insider*, 08 June 2021.

⁸³⁶ “Wilderness Youth: The Invisible Line of Defense” (旷野青春 | 隐形防线), *China Science Communication* (Online), 10 December 2019, <https://www.youtube.com/watch?v=ovnUyTRMERI>

⁸³⁷ Alyin Woodward, “An Unsubstantiated Theory Suggests the Coronavirus Accidentally Leaked from a Chinese Lab — Here are the Facts,” *Business Insider*, 15 April 2020.

⁸³⁸ Eva Dou and Lily Kuo, “A Scientist Adventurer and China’s ‘Bat Woman’ are Under Scrutiny as Coronavirus Lab-Leak Theory Gets Another Look,” *The Washington Post*, 03 June 2021.

⁸³⁹ Gao Ding (高丁), Zhang Qiang (章强), Han Kun (韩坤), Qian Qing (钱庆), Cheng Wenbo (程文播), and Men Dong (门冬), “An Integrated System for Use in Biological Protection,” (一种用于生物防护的集成装置), *National Intellectual Property Administration of China* (Online), application date 11 December 2019, patent authorization date 28 August 2020, Patent Authorization Number: CN 211375358 U.

⁸⁴⁰ Ibid. Emphasis added. The quoted text is “本实用新型通过差压变送器实时检测气路的压力, 并将检测的信号反馈给控制组件, 控制组件发送指令给电磁阀, 通过电磁阀来关闭气路, 能够实时监控气路的气压, 避免气路异常失效造成的危险。”

⁸⁴¹ For example, “Negative pressure is required if adjacent area is a lower biosafety level or non-laboratory space” at UC San Diego. “Biosafety Level (BSL) Practices Chart,” *University of California at San Diego* (Online), 13 September 2022. Another lab safety course stated for BSL-3 facilities that “the laboratory should be kept at a negative pressure at all times, even if there is a bio safety cabinet failure.” See, “Laboratory Safety: Work Practices for Mycobacterium Tuberculosis,” *Association of Public Health Laboratories* (Online). A PDF can be found here: https://www.aphl.org/programs/infectious_disease/tuberculosis/TBCore/Laboratory_Safety_Work_Practices_for_Mycobacterium_tuberculosis-WithNotes.pdf

⁸⁴² Emphasis added. The quoted text is “目前一般的高效过滤器的接头主要以卡盘接头为主, 要想在生物防护设备中使用, 就需要添加多级连接管固定, 尤其是在运输过程中的稳定性, 多段连接就意味着多段风险, 同时也需要多阶段的检测, 急需一款模块形式的稳定的高效过滤装置... 另外, 当在运输过程中发生意外, 没有有效的监控装置来判断设备是否正常.” Gao Ding (高丁), Zhang Qiang (章强), Han Kun (韩坤), Qian Qing (钱庆), Cheng Wenbo (程文播), and Men Dong (门冬), “An Integrated System for Use in Biological Protection,” (一种用于生物防护的集成装置), *National Intellectual Property Administration of China* (Online), application date 11 December 2019, patent authorization date 28 August 2020, Patent Authorization Number: CN 211375358 U.

⁸⁴³ “Competitive Bid on Chinese Academy of Sciences Wuhan Institute of Virology Central Air Conditioning Renovation Project” (中国科学院武汉病毒研究所中央空调改造工程竞争性磋商), Chinese Government Procurement Network (中国政府采购网), 16 September 2019. Thanks to the DRASTIC Research Group for locating this document and archiving it. <https://archive.ph/bfoTD>

⁸⁴⁴ “Announcement of Sole Source Procurement Order for Air Incinerator Device and Testing Services for the Chinese Academy of Sciences Wuhan Institute of Virology” (中国科学院武汉病毒研究所采购空气焚烧装置以及测试服务项目拟采用单一来源采购方式公示), *Chinese Government Procurement Network* (中国政府采购网), 03 December 2019. Thanks to the DRASTIC Research Group for locating and archiving this document. <https://archive.ph/jifqr>

⁸⁴⁵ The quoted text is “结合近期保密违法案例.” See “Wuhan Institute of Virology Holds 2019 Entry Training for New Employees” (武汉病毒所举办 2019 年新进职工入所培训), *Wuhan Institute of Virology* (Online), 16 December 2019.

⁸⁴⁶ Eva Dou, “Wuhan Lab’s Classified Work Complicates Search for Pandemic’s Origins,” *The Washington Post*, 22 June 2021.

⁸⁴⁷ “Wuhan Institute of Virology Launches Educational Activities for 2019 New Students Matriculating to the Institute” (武汉病毒所开展 2019 级新生入所教育活动), *Wuhan Institute of Virology* (Online), 05 September 2019.

⁸⁴⁸ Ian Birrell, “Top US Scientist Reveals He First Heard about Virus Outbreak in Wuhan Two Weeks before Beijing Warned the World about Covid,” *The Daily Mail*, 04 September 2021.

⁸⁴⁹ Ibid.

⁸⁵⁰ The Editorial Board of the Washington Post, “As the Pandemic Exploded, A Researcher Saw the Danger. China’s Leader Kept Silent,” *The Washington Post*, 22 April 2022.

⁸⁵¹ Wang Xiaoli (王小姐) and Zhou Dongsheng (周冬生), “Looking toward the International Biosecurity Situation in 2035,” (面向 2035 年的国际生物安全形势), *The Study Times* (学习时报), 20 December 2019.

⁸⁵² Ibid. Emphasis added. The quoted text is “突发生物事件影响范围已经从民众健康扩展为影响国家安全和战略利益. 传统生物安全问题与非传统生物安全问题交织, 外来生物威胁与内部监管漏洞风险并存.”

⁸⁵³ Ibid. The quoted text is “发展中国家对生物科技负面作用的管控体系和能力有欠缺, 有明显的内部性威胁, 同时生物科技在许多战略方向存在 ‘卡脖子’ 现象, 有隐性的外部性威胁.”

⁸⁵⁴ Ibid. The quoted terms are “薄弱环节” 和 “短板.” Both of these terms will be used by Xi Jinping to describe China’s biosecurity and biosafety conditions in public remarks in February 2020.

⁸⁵⁵ Wang Jiaying (王嘉兴), “Before Zhong Nanshan Said a Word, This Wuhan Doctor Gave an Outbreak Warning to Schools in the Vicinity” (在钟南山发话前, 武汉这位医生向附近学校发出疫情警报), *China Youth Daily Freezing Point Weekly* (中国青年报冰点周刊), 28 January 2020. The doctor’s initial warnings were down anonymously, but she gave the journalist permission to disclose her identity. She was Lü Xiaohong (吕小红), the director of the digestive and internal medicine department at the Wuhan Municipal No. 5 Hospital.

⁸⁵⁶ Mai He, Li Li, Louis P. Dehner, “China’s Reactions to COVID-19 Outbreaks in Wuhan Before Lockdown: The Impact of Three Weeks Delay,” *SSRN*, preprint, 07 July 2020, pg. 6.

⁸⁵⁷ The quoted text is “到目前为止调查未发现明显人传人现象, 未发现医务人员感染.” See “Wuhan Municipal Health Commission Situational Report on a Pneumonia Epidemic Currently in our City” (武汉市卫健委关于当前我市肺炎疫情的情况通报), *Wuhan Municipal Health Commission* (Online), 31 December 2019.

⁸⁵⁸ Yao Yuan, Ma Yujie, Zhou Jialu and Hou Wenkun, “Chinese Doctor Recalls First Encounter with Mysterious Virus,” *Xinhua News Agency*, 16 April 2020.

⁸⁵⁹ The quoted text is “儿子来了, 没有症状, 但肺部 CT 发现他的肺也是呈磨玻璃状——病毒性肺炎的表现.” See, “Zhang Jixian: Reporting an Outbreak to the Authorities is a Requirement of my Profession” (张继先: 疫情上报是我的职业要求), *Changjiang Daily* (长江日报), 24 November 2020.

⁸⁶⁰ Yao Yuan, Ma Yujie, Zhou Jialu and Hou Wenkun, “Chinese Doctor Recalls First Encounter with Mysterious Virus,” *Xinhua News Agency*, 16 April 2020.

⁸⁶¹ “Zhang Jixian: Reporting an Outbreak to the Authorities is a Requirement of my Profession” (张继先: 疫情上报是我的职业要求), *Changjiang Daily* (长江日报), 24 November 2020.

⁸⁶² Ibid.

⁸⁶³ Gao Yu, Peng Yanfeng, Yang Rui, Feng Yuding, Ma Danmeng, Flynn Murphy, Han Wei and Timmy Shen, “How Early Signs of the Coronavirus were Spotted, Spread and Throttled in China,” *Caixin Global*, 28 February 2020.

⁸⁶⁴ The Editorial Board of the Washington Post, “As the Pandemic Exploded, A Researcher Saw the Danger. China’s Leader Kept Silent,” *The Washington Post*, 22 April 2022.

⁸⁶⁵ Gao Yu, et. al., 28 February 2020. The Associated Press also independently confirmed that Vision Medicals had sequenced the genome by December 27. See “China Delayed Releasing Coronavirus Info, Frustrating WHO,” *The Associated Press*, 02 June 2020.

⁸⁶⁶ “WHO Statement regarding Cluster of Pneumonia Cases in Wuhan, China,” *World Health Organization* (Online), 09 January 2020.

⁸⁶⁷ Gao Yu, Peng Yanfeng, Yang Rui, Feng Yuding, Ma Danmeng, Flynn Murphy, Han Wei and Timmy Shen, “How Early Signs of the Coronavirus were Spotted, Spread and Throttled in China,” *Caixin Global*, 28 February 2020.

⁸⁶⁸ Ibid.

⁸⁶⁹ Ibid.

⁸⁷⁰ Ibid.

⁸⁷¹ Zaheer Allam, “The First 50 days of COVID-19: A Detailed Chronological Timeline and Extensive Review of Literature Documenting the Pandemic” in *Surveying the Covid-19 Pandemic and its Implications*, 2020, Elsevier Public Health Emergency Collection (Online), p 4.

⁸⁷² Ibid; Gao Yu, Peng Yanfeng, Yang Rui, Feng Yuding, Ma Danmeng, Flynn Murphy, Han Wei and Timmy Shen, “How Early Signs of the Coronavirus were Spotted, Spread and Throttled in China,” *Caixin Global*, 28 February 2020. For direct acknowledgment that Zhang and his Australian research partners knew they were defying the NHC gag order, see Jasper Becker, *Made in China: Wuhan, Covid, and the Quest for Biotech Supremacy*, (London: C. Hurst & Co. Ltd., 2021), p. 221.

⁸⁷³ The quoted text is “我市华南海鲜市场陆续出现不明原因肺炎病人.” See “Municipal Health Commission’s Urgent Notice on Reporting on the Critical Care Situation for Pneumonia of Unknown Etiology (市卫生健康委关于报送不明原因肺炎救治情况的紧急通知), *Wuhan Municipal Health Commission* reposted on *Wikisource* (维基文库), 30 December 2019.

⁸⁷⁴ Ibid.

⁸⁷⁵ The quoted text is “我市部分医疗机构陆续出现不明原因肺炎病人.” See “Urgent Notice on Doing a Good Job with Critical Care for Pneumonia of Unknown Etiology” (关于做好不明原因肺炎救治工作的紧急通知), *Wuhan Municipal Health Commission* reposted on *Wikisource* (维基文库), 30 December 2019.

⁸⁷⁶ Ibid. The quoted text is “未经授权任何单位, 个人不得擅自对外发布救治信息.”

⁸⁷⁷ Jane McMullen, “Covid-19: Five Days that Shaped the Outbreak,” *BBC News*, 26 January 2021.

⁸⁷⁸ Alina Chan and Matt Ridley, *Viral: The Search for the Origin of COVID-19*, (Harper Collins Publishers: New York, November 2021), pg. 49.

⁸⁷⁹ The Investigative Unit of the National Supervision Commission, “Notice Regarding the Investigation of the Situation Involving Dr. Li Wenliang and the Public Response,” (关于群众反映的涉及李文亮医生有关情况调查的通报), *Xinhua News Agency*, 19 March 2020.

⁸⁸⁰ Ibid; and “Li Wenliang: Coronavirus Kills Chinese Whistleblower Doctor,” *BBC News*, 07 February 2020; and Chris Buckley, “Chinese Doctor, Silenced After Warning of Outbreak, Dies From Coronavirus,” *New York Times*, 06 February 2020.

⁸⁸¹ Lily Kuo, “Coronavirus: Wuhan Doctor Speaks Out Against Authorities,” *The Guardian*, 11 March 2020.

⁸⁸² “Timeline of China Releasing Information on COVID-19 and Advancing International Cooperation,” *Xinhua* reposted on the *National Health Commission of the People’s Republic of China*, 06 April 2020.

⁸⁸³ See “Wuhan Municipal Health Commission Situational Report on a Pneumonia Epidemic Currently in our City” (武汉市卫健委关于当前我市肺炎疫情的情况通报), *Wuhan Municipal Health Commission* (Online), 31 December 2019.

⁸⁸⁴ Ibid. The quoted text is “到目前为止调查未发现明显人传人现象, 未发现医务人员感染.”

⁸⁸⁵ The PRC has a powerful central government based in Beijing. It is not federalized and does not share its powers with provincial and local authorities. Provincial and local authorities in China are subordinate to the Communist Party and state authorities at the central level, and must seek Beijing’s approval for major decisions, such as responding to an epidemic. For an excellent primer on politics in the PRC, see “Chapter One: The Red Machine” in Richard McGregor, *The Party: The Secret World of China’s Communist Rulers*, Penguin Group: London, 2010, pg. 1-33.

⁸⁸⁶ Mai He, Li Li, Louis P. Dehner, “China’s Reactions to COVID-19 Outbreaks in Wuhan Before Lockdown: The Impact of Three Weeks Delay,” *SSRN*, preprint, 07 July 2020, pg. 7.

⁸⁸⁷ See, “Wuhan Municipal Health Commission Situational Report on a Pneumonia Epidemic Currently in our City” (武汉市卫健委关于当前我市肺炎疫情的情况通报), *Wuhan Municipal Health Commission* (Online), 31 December 2019.

⁸⁸⁸ Ibid.

⁸⁸⁹ Ibid. The relevant text is “...目前已发现 27 例病例, 其中 7 例病情严重, 其余病例病情稳定可控, 有 2 例病情好转拟于近期出院.”

⁸⁹⁰ Ibid. The quoted text is “目前对病原的检测及感染原因的调查正在进行中.”

⁸⁹¹ Ibid. The relevant text is “近期部分医疗机构发现接诊的多例肺炎病例与华南海鲜城有关联.”

⁸⁹² Jon Cohen, “Wuhan Seafood Market May Not be Source of Novel Virus Spreading Globally,” *Science Magazine*, 26 January 2020; and Teddy Ng, “No Link with Seafood Market in First Case of China Coronavirus, Chinese Scientists Revealed,” *South China Morning Post*, 25 January 2020.

⁸⁹³ Bin Cao, et al., “Clinical Features of Patients Infected with 2019 Novel Coronavirus in Wuhan, China,” *The Lancet*, Volume 395, Issue 10223, 24 January 2020 (published online) and 15 February 2020 (in print), p.497.

⁸⁹⁴ James T. Areddy, “China Rules Out Animal Market and Lab as Coronavirus Origin,” *The Wall Street Journal*, 26 May 2020.

⁸⁹⁵ Lisa Schnirring, “Report: Thailand’s Coronavirus Patient Didn’t Visit Outbreak Market,” *Center for Infectious Disease Research and Policy at the University of Minnesota* (Online), 14 January 2020.

⁸⁹⁶ For examples, see “China detects large quantity of novel coronavirus at Wuhan seafood market,” *XinhuaNet*, 27 January 2020; Jason Beaubian, “Why They’re Called ‘Wet Markets’ — And What Health Risks They Might Pose,” *National Public Radio*, 31 January 2020; Aylin Woodward, “Both the New Coronavirus and SARS Outbreaks Likely Started in Chinese ‘Wet Markets.’ Historic Photos Show What the Markets Looked Like,” *Business Insider*, 26 February 2020; and Dina Fine Maron, “‘Wet Markets’ Likely Launched the Coronavirus. Here’s What You Need to Know,” *National Geographic*, 15 April 2020.

⁸⁹⁷ See, Michael Worobey, “Dissecting the Early COVID-19 Cases in Wuhan,” *Science Magazine*, 18 November 2021, Volume 374, Issue 6572, pp. 1202-1204.

⁸⁹⁸ James T. Areddy, “China Rules Out Animal Market and Lab as Coronavirus Origin,” *Wall Street Journal*, 26 May 2020.

⁸⁹⁹ The quoted text is “...市卫健委接到报告后, 立即在全市医疗卫生机构开展与华南海鲜城有关联的病例搜索和回顾性调查...” See “Wuhan Municipal Health Commission Situational Report on a Pneumonia Epidemic Currently in our City” (武汉市卫健委关于当前我市肺炎疫情的情况通报), *Wuhan Municipal Health Commission* (Online), 31 December 2019.

⁹⁰⁰ The quoted text is “肖菊华强调, 要积极争取国家卫健委, 中科院指导和支持, 省, 市, 区密切配合.” See, Wen Jun (文俊), “Xiao Juhua Stresses All-Out Support for Construction of Center for Biosafety Mega-Science” (肖菊华强调全力支持建设生物安全大科学中心), *Hebei Daily* reprinted on the *Hubei Provincial People’s Government* (Online), 07 December 2019.

⁹⁰¹ Emphasis added. The quoted text is “目前, 所有病例均已隔离治疗, 密切接触者的追踪调查和医学观察正在进行中, 对华南海鲜城的卫生学调查和环境卫生处置正在进行中.” See, “Wuhan Municipal Health Commission Situational Report on a Pneumonia Epidemic Currently in our City” (武汉市卫健委关于当前我市肺炎疫情的情况通报), the *Wuhan Municipal Health Commission* (Online), 31 December 2019.

⁹⁰² Ibid. The quoted text is “到目前为止调查未发现明显人传人现象, 未发现医务人员感染.”

⁹⁰³ Bin Cao, Jianwei Wang, et. al., “Clinical Features of Patients Infected with 2019 Novel Coronavirus in Wuhan, China,” *The Lancet*, Volume 395, Issue 10223, P497-506, February 15, 2020, published online on 24 January 2020.

⁹⁰⁴ The quoted text is “该病可防可控, 预防上保持室内空气流通, 避免到封闭, 空气不流通的公众场合和人多集中地方, 外出可佩戴口罩。” See, “Wuhan Municipal Health Commission Situational Report on a Pneumonia Epidemic Currently in our City” (武汉市卫健委关于当前我市肺炎疫情的情况通报), the *Wuhan Municipal Health Commission* (Online), 31 December 2019.

⁹⁰⁵ “China Didn’t Warn Public of Likely Pandemic for 6 Key Days,” *The Associated Press*, 15 April 2020.

⁹⁰⁶ The quoted text is “目前对病原的检测及感染原因的调查正在进行中。” See, “Wuhan Municipal Health Commission Situational Report on a Pneumonia Epidemic Currently in our City” (武汉市卫健委关于当前我市肺炎疫情的情况通报), *Wuhan Municipal Health Commission* (Online), 31 December 2019.

⁹⁰⁷ Ibid. The relevant text is “引起病毒性肺炎的病毒以流行性感冒病毒为常见, 其他为副流感病毒, 巨细胞病毒, 腺病毒, 鼻病毒, 冠状病毒等。”

⁹⁰⁸ Du Juan, “Wuhan Wet Market Closes Amid Pneumonia Outbreak,” *The China Daily*, 01 January 2020.

⁹⁰⁹ Ibid. See also, Xiao Xiao, et. al., “Animal Sales from Wuhan Wet Markets Immediately Prior to the COVID-19 Pandemic,” *Scientific Reports*, 11, Article number: 11898 (2021), published online on 07 June 2021.

⁹¹⁰ “Wuhan’s ‘Wet Markets’ are Back in Business,” *ABC News*, 17 April 2020.

⁹¹¹ For example, see “Chinese Doctor who Diagnosed Early Coronavirus Cases in Wuhan Says Local Officials Covered up the Scale of the Initial Outbreak,” *The Daily Mail*, 27 July 2020.

⁹¹² The quoted text is “8 名散布谣言者, 已被依法查处。” See, “Eight Pneumonia Epidemic Rumormongers in Wuhan Investigated and Dealt With” (武汉 8 名散布肺炎疫情谣言者被查处), *People’s Daily*, 02 January 2020.

⁹¹³ Ibid. The quoted text is “在网络上发布, 转发不实信息, 造成不良社会影响。”

⁹¹⁴ “Eight Pneumonia Epidemic Rumormongers in Wuhan Investigated and Dealt With” (武汉 8 名散布肺炎疫情谣言者被查处), *The People’s Daily*, 02 January 2020.

⁹¹⁵ “CCTV: Eight Rumormongers Investigated and Dealt With” (CCTV: 8 名散布谣言者被查处), *China Central Television*, 02 January 2020, reposted on *China Digital Times*, 29 January 2020.

⁹¹⁶ The Investigative Unit of the National Supervision Commission, “Notice Regarding the Investigation of the Situation Involving Dr. Li Wenliang and the Public Response,” (关于群众反映的涉及李文亮医生有关情况调查的通报), *Xinhua News Agency*, 19 March 2020. Here is the official account of what happened to Li: “2020 年 1 月 3 日 13 时 30 分左右, 武汉市公安局武昌分局中南路派出所与李文亮医生联系后, 李文亮医生在同事陪同下来到该派出所。派出所副所长杨某安排负责内勤的民警胡某与李文亮医生谈话。经谈话核实后, 谈话人员现场制作了笔录。李文亮医生表示, 在微信群中发有关 SARS 的信息是不对的, 以后会注意的, 谈话人员对李文亮医生制作了训诫书。李文亮医生亦持有 1 份训诫书, 于 14 时 30 分许离开派出所。”

⁹¹⁷ Jane McMullen, “Covid-19: Five Days that Shaped the Outbreak,” *BBC News*, 26 January 2021; Chris Buckley, “Chinese Doctor, Silenced After Warning of Outbreak, Dies From Coronavirus,” *New York Times*, 06 February 2020.

⁹¹⁸ Alina Chan and Matt Ridley, *Viral: The Search for the Origin of COVID-19*, (Harper Collins Publishers: New York, November 2021), pg. 50.

⁹¹⁹ Jing-Bao Nie and Carl Elliott, “Humiliating Whistle-Blowers: Li Wenliang, the Response to Covid-19, and the Call for a Decent Society,” *Journal of Bioethical Inquiry*, 25 Aug 2020, pg. 1–5.

⁹²⁰ Alina Chan and Matt Ridley, *Viral: The Search for the Origin of COVID-19*, (Harper Collins Publishers: New York, November 2021), pg. 51.

⁹²¹ Lily Kuo, “‘They’re Chasing Me’: the Journalist who wouldn’t Stay Quiet on Covid-19,” *the Guardian*, 01 March 2020; Yew Lun Tian, “Chinese Citizen Journalist Resurfaces after Going Missing in Wuhan,” *Reuters*, 23 April 2020.

⁹²² Nectar Gan and Natalie Thomas, “Chen Qiushi Spoke Out about the Wuhan Virus. Now his Family and Friends Fear he’s been Silenced,” *CNN*, 09 February 2020; and Keith Zhai, “Chinese Citizen Journalist Who Documented Covid-19 in Wuhan Resurfaces After 600 Days,” *Wall Street Journal*, 01 October 2021.

⁹²³ “Coronavirus: Why have two reporters in Wuhan disappeared?,” *BBC News*, 14 February 2020; and “Concerns Grow For ‘Disappeared’ Wuhan Citizen Journalist,” *Radio Free Asia*, 09 March 2021.

⁹²⁴ Keir Simmons, Jennifer Jett, Amy Perrette and Elizabeth Kuhr, “A Reporter Risked Her Life to Show the World Covid in Wuhan. Now She may not Survive Jail,” *NBC News*, 18 December 2021; and Amy Chang Chien and Austin

Ramzy, "Chinese Citizen Who Documented Wuhan Outbreak Falls Ill in Prison Hunger Strike," *New York Times*, 08 October 2021.

⁹²⁵ Gao Yu, Peng Yanfeng, Yang Rui, Feng Yuding, Ma Danmeng, Flynn Murphy, Han Wei and Timmy Shen, "How Early Signs of the Coronavirus were Spotted, Spread and Throttled in China," *Caixin Global*, 28 February 2020.

⁹²⁶ Sharri Markson, *What Really Happened in Wuhan*, Sydney, Australia: HarperCollins Publishers, September 2021, pg. 357-358.

⁹²⁷ A "red-letterhead document" refers to an official directive or policy document issued by a PRC central government or communist party office. The relevant agency that produced the document is printed prominently in red ink at the top. For more information, see George C. Chen and Matthias Stepan, "Ruling the Country by Red Letterhead Documents?," *University of Nottingham Asia Research Institute*, 19 September 2017.

⁹²⁸ The Chinese title of the directive was "关于在重大突发传染病防控工作中加强生物样本资源及相关科研活动管理工作的通知." See, Lin Tingyao (林庭瑶) and Ni Huairan (倪懷仁), "Exclusively Obtained Red-Letterhead Document: The Chinese Communist Party Concealed Wuhan Epidemic" (獨家取得紅頭文件: 中共隱瞞武漢疫情), *The Storm Media* (瘋傳媒), 15 April 2020. Note The Storm Media is based in Taiwan, not China.

⁹²⁹ Ibid. The Associated Press also reviewed the official directive in question. See, "China Delayed Releasing Coronavirus Info, Frustrating WHO," *The Associated Press*, 02 June 2020. The PRC authorities also eventually admitted, at least in part, to having ordered labs to destroy early samples. See, Zhuang Pinghui, "China Confirms Unauthorized Labs Were Told to Destroy Early Coronavirus Samples," *The South China Morning Post*, 15 May 2020.

⁹³⁰ Gao Yu, Peng Yanfeng, Yang Rui, Feng Yuding, Ma Danmeng, Flynn Murphy, Han Wei and Timmy Shen, "How Early Signs of the Coronavirus were Spotted, Spread and Throttled in China," *Caixin Global*, 28 February 2020.

⁹³¹ Jon Cohen, "Wuhan Coronavirus Hunter Shi Zhengli Speaks Out" and "Reply to Science Magazine," *Science Magazine*, 31 July 2020, Volume 369, Issue 6503, pg. 487-488.

⁹³² Jasper Becker, *Made in China: Wuhan, Covid, and the Quest for Biotech Supremacy*, (London: C. Hurst & Co. Ltd., 2021), p. 219.

⁹³³ Katherine Eban, "The Lab Leak Theory: Inside the Fight to Uncover COVID-19's Origins," *Vanity Fair*, 03 June 2021.

⁹³⁴ This refers to a "seamless" ligation method, that is a viral genome editing technique, which leaves no trace of artificial ligation as the restriction sites do not remain in the final sequence after ligation. It was developed by Ralph Baric of the University of North Carolina Chapel Hill. See R.S. Baric and A.C. Sims, "Development of Mouse Hepatitis Virus and SARS CoV Infectious cDNA Constructs," *Current Topics in Microbiology and Immunology* (2005), 287: 229-252.

⁹³⁵ For a helpful review of Baric's work with the WIV, see Yuri Deigin, "Lab-Made? SARS-CoV-2 Genealogy Through the Lens of Gain-of-Function Research," *Medium.com*, 22 April 2020.

⁹³⁶ Jon Cohen, "Chinese Researchers Reveal Draft Genome of Virus Implicated in Wuhan Pneumonia Outbreak," *Science Magazine*, 11 January 2020.

⁹³⁷ "COVID-19 – China," *World Health Organization* (Online), 05 January 2020.

⁹³⁸ "China Delayed Releasing Coronavirus Info, Frustrating WHO," *The Associated Press*, 02 June 2020.

⁹³⁹ "COVID-19 – China," *World Health Organization* (Online), 05 January 2020.

⁹⁴⁰ Ibid.

⁹⁴¹ "Wuhan Institute of Virology Convenes Safety, Record-Keeping Work Conference" (武汉病毒所召开安全, 档案工作会议), *Wuhan Institute of Virology* (Online), 07 January 2020.

⁹⁴² Ibid. Emphasis added. The quoted text is "剖析了研究所在安全, 档案管理过程中存在的困难和问题, 提出解决措施, 并对 2020 年相关工作进行部署安排."

⁹⁴³ Ibid. Emphasis added. The quoted text is "确保安全无事故" and "做好全年的安全, 档案工作至关重要."

⁹⁴⁴ Ibid. Emphasis added. The quoted text is "要充分认识安全工作的艰巨性, 复杂性, 突发性, 长期性, 进一步增强安全意识, 责任意识, 危机意识, 任何时候都不能对安全工作掉以轻心, 必须进一步强化安全责任落实, 强化安全隐患整改, 强化危化品使用管理, 兢兢业业, 尽职尽责做好安全的各项工作."

⁹⁴⁵ Ibid. The quoted text is "严格执行国家, 中科院及研究所相关规定, 按时保质保量完成部门档案收集, 整理, 及移交工作."

⁹⁴⁶ The original post has been removed from the website of the Wuhan Municipal People's Government. For a secondary source, see Jim Geraghty, "The Comprehensive Timeline of China's COVID-19 Lies," *National Review*, 23 March 2020.

⁹⁴⁷ Ibid. The original post has been removed from the website of the Wuhan Municipal People's Government.

⁹⁴⁸ Emphasis added. Sanjay Gupta, "Autopsy of a Pandemic: 6 Doctors at the Center of the US Covid-19 Response," *CNN*, 26 March 2021.

⁹⁴⁹ Ibid.

⁹⁵⁰ "A Conversation with Robert Redfield," *Council on Foreign Relations* (Online), 10 December 2020.

⁹⁵¹ Lin Tingyao (林庭瑶) and Ni Huairan (倪懷仁), "Exclusively Obtained Red-Letterhead Document: The Chinese Communist Party Concealed Wuhan Epidemic" (獨家取得紅頭文件: 中共隱瞞武漢疫情), *The Storm Media* (瘋傳媒), 15 April 2020.

⁹⁵² The quoted text is "1月7日, 我主持召开中央政治局常委会会议时, 就对新型冠状病毒肺炎疫情防控工作提出了要求." See "Xi Jinping: Speech at the Meeting of the Politburo Standing Committee of the CCP Central Committee to Study the Work to Respond to the Novel Coronavirus Pneumonia Epidemic" (习近平: 在中央政治局常委会会议研究应对新型冠状病毒肺炎疫情工作时的讲话), *Seeking Truth* (求是) reposted on the *Central Government of the People's Republic of China* (Online), 15 February 2020.

⁹⁵³ "Xi Jinping Attends Summary Meeting on the Educational Theme of 'Never Forget Our Original Aspiration and Remember Our Founding Mission' and Delivers Important Speech" (习近平出席 '不忘初心, 牢记使命' 主题教育总结大会并发表重要讲话), *Xinhua News Agency* re-posted on the *Central Government of the People's Republic of China* (Online), 08 January 2020.

⁹⁵⁴ Ibid. The quoted text is "...坚决清除一切弱化党的先进性, 损害党的纯洁性的因素, 坚决割除一切滋生在党的肌体上的毒瘤..."

⁹⁵⁵ Ibid. The quoted text is "...坚决防范一切违背初心和使命, 动摇党的根基的危险..."

⁹⁵⁶ The phrase "preliminary assessment," which is used throughout the report, is 初步判定. One might also translate it as an "initial determination." See, "Expert Claims Etiological Identification Study Makes Preliminary Progress in Linking Novel Coronavirus to Wuhan Outbreak of Pneumonia of Unknown Origin," (专家称系新型冠状病毒 武汉不明原因的病毒性肺炎疫情病原学鉴定取得初步进展) *Xinhua News Agency*, 09 January 2020. For an English source, see Natasha Khan, "New Virus Discovered by Chinese Scientists Investigating Pneumonia Outbreak," *Wall Street Journal*, 08 January 2020.

⁹⁵⁷ Xu Jianguo is actually the director of the Infectious Disease Prevention and Control Institute of the Chinese Center for Disease Control and Prevention, but *Xinhua* curiously did not list that affiliation in its description of him. See, "Expert Claims Etiological Identification Study Makes Preliminary Progress in Linking Novel Coronavirus to Wuhan Outbreak of Pneumonia of Unknown Origin," (专家称系新型冠状病毒 武汉不明原因的病毒性肺炎疫情病原学鉴定取得初步进展) *Xinhua News Agency*, 09 January 2020.

⁹⁵⁸ In addition to his CCDPC affiliation described above, Xu is also the director of the state-run Institute of Epidemiology and Microbiology at the Chinese Academy of Preventative Medical Science, but *Xinhua* only referred to him as a "Chinese Academy of Engineering academician" and the head of the assessment team advising the government. For his full bio, see "Xu Jianguo/List of Academicians/Corps of Academicians" (徐建国/院士名单/院士队伍), *Chinese Academy of Engineering* (Online), last accessed on 15 April 2022.

⁹⁵⁹ "Expert Claims Etiological Identification Study Makes Preliminary Progress in Linking Novel Coronavirus to Wuhan Outbreak of Pneumonia of Unknown Origin," (专家称系新型冠状病毒 武汉不明原因的病毒性肺炎疫情病原学鉴定取得初步进展) *Xinhua News Agency*, 9 January 2020.

⁹⁶⁰ Gao Yu, et. al., 28 February 2020. This information was independently verified by the Associated Press. See, "China Delayed Releasing Coronavirus Info, Frustrating WHO," *The Associated Press*, 02 June 2020.

⁹⁶¹ Jane Qiu, "How China's 'Bat Woman' Hunted Down Viruses from SARS to the New Coronavirus," *Scientific American*, 11 March 2020.

⁹⁶² The quoted text is "研究所于2020年1月2日确定了新型冠状病毒(以下称2019新型冠状病毒)全基因组序列, 于1月5日成功分离到了病毒毒株." See, "Wuhan Institute of Virology Launches All-Out Research Attack Against Novel Coronavirus Pneumonia" (武汉病毒所全力开展新型冠状病毒肺炎科研攻关), *Wuhan Institute of Virology* (Online), 29 January 2020.

⁹⁶³ Alina Chan and Matt Ridley, *Viral: The Search for the Origin of COVID-19*, (Harper Collins Publishers: New York, November 2021), pg. 51.

⁹⁶⁴ Wenjie Tan, Xiang Zhao, Xuejun Ma, Wenling Wang, Peihua Niu, Wenbo Xu, George F. Gao, Guizhen Wu, "Notes from the Field: A Novel Coronavirus Genome Identified in a Cluster of Pneumonia Cases — Wuhan, China 2019–2020," *China CDC Weekly*, 2020, 2(4): 61–62.

⁹⁶⁵ China Delayed Releasing Coronavirus Info, Frustrating WHO," *The Associated Press*, 02 June 2020; and Charlie Campbell, "Exclusive: The Chinese Scientist Who Sequenced the First COVID-19 Genome Speaks Out About the Controversies Surrounding His Work," *Time Magazine*, 24 August 2020.

⁹⁶⁶ Natasha Khan, "New Virus Discovered by Chinese Scientists Investigating Pneumonia Outbreak," *The Wall Street Journal*, 08 January 2020.

⁹⁶⁷ "China Delayed Releasing Coronavirus Info, Frustrating WHO," *The Associated Press*, 02 June 2020; and Gao Yu, Peng Yanfeng, Yang Rui, Feng Yuding, Ma Danmeng, Flynn Murphy, Han Wei and Timmy Shen, "How Early Signs of the Coronavirus were Spotted, Spread and Throttled in China," *Caixin Global*, 28 February 2020.

⁹⁶⁸ The quoted text is "引起此次疫情的新型冠状病毒不同于已发现的人类冠状病毒。" See "Expert Claims Etiological Identification Study Makes Preliminary Progress in Linking Novel Coronavirus to Wuhan Outbreak of Pneumonia of Unknown Origin," (专家称系新型冠状病毒 武汉不明原因的病毒性肺炎疫情病原学鉴定取得初步进展) *Xinhua News Agency*, 9 January 2020.

⁹⁶⁹ Emphasis added. Dennis Normile, "Mystery Virus Found in Wuhan Resembles Bat Viruses but not SARS, Chinese Scientist Says," *Science Magazine*, 10 January 2020.

⁹⁷⁰ To be precise, the complete genome sequence similarities between SARS-CoV-1 and SARS-CoV-2 are $79.4 \pm 0.17\%$. See, Zigui Chen, Siaw S. Bloom, Maggie H. Wang, Renee W.Y. Chan, and Paul K.S. Chan, "Genomic and Evolutionary Comparison between SARS-CoV-2 and Other Human Coronaviruses," *Journal of Virological Methods*, 2021 March; 289: 114032. Published online on 05 December 2020.

⁹⁷¹ Charlie Campbell, "Exclusive: The Chinese Scientist Who Sequenced the First COVID-19 Genome Speaks Out About the Controversies Surrounding His Work," *Time Magazine*, 24 August 2020.

⁹⁷² Ibid.

⁹⁷³ Gao Yu, Peng Yanfeng, Yang Rui, Feng Yuding, Ma Danmeng, Flynn Murphy, Han Wei and Timmy Shen, "How Early Signs of the Coronavirus were Spotted, Spread and Throttled in China," *Caixin Global*, 28 February 2020.

⁹⁷⁴ "China Delayed Releasing Coronavirus Info, Frustrating WHO," *The Associated Press*, 02 June 2020.

⁹⁷⁵ Alina Chan and Matt Ridley, *Viral: The Search for the Origin of COVID-19*, (Harper Collins Publishers: New York, November 2021), pg. 56.

⁹⁷⁶ Charlie Campbell, "Exclusive: The Chinese Scientist Who Sequenced the First COVID-19 Genome Speaks Out About the Controversies Surrounding His Work," *Time Magazine*, 24 August 2020.

⁹⁷⁷ Alina Chan and Matt Ridley, *Viral: The Search for the Origin of COVID-19*, (Harper Collins Publishers: New York, November 2021), pg. 57.

⁹⁷⁸ Ibid. Zhang and Holmes knew they were violating the NHC gag order of January 3. See, Jasper Becker, *Made in China: Wuhan, Covid, and the Quest for Biotech Supremacy*, (London: C. Hurst & Co. Ltd., 2021), p. 221.

⁹⁷⁹ Charlie Campbell, "Exclusive: The Chinese Scientist Who Sequenced the First COVID-19 Genome Speaks Out About the Controversies Surrounding His Work," *Time Magazine*, 24 August 2020.

⁹⁸⁰ For an analysis of the meaning of "rectification" in the CCP parlance, see Andrew Mertha, "Rectification," in *Afterlives of Chinese Communism*, Christian Sorace, et. al., eds., Australian National University Press: Canberra, 2019, pg. 207–214.

⁹⁸¹ Zhuang Pinghui, "Chinese Laboratory that First Shared Coronavirus Genome with World Ordered to Close for 'Rectification', Hindering its Covid-19 Research," *South China Morning Post*, 28 February 2020.

⁹⁸² Daniel R. Lucey, "Comments on Key Documents from the Early Weeks of SARS-CoV-2," *Infectious Diseases Society of America* (Online), 24 August 2021.

⁹⁸³ Ibid.

⁹⁸⁴ The original post has been removed from the website of the Wuhan Municipal People's Government. For a secondary source, see Jim Geraghty, "The Comprehensive Timeline of China's COVID-19 Lies," *National Review*, 23 March 2020.

⁹⁸⁵ "China Delayed Releasing Coronavirus Info, Frustrating WHO," *The Associated Press*, 02 June 2020.

⁹⁸⁶ Ibid.

⁹⁸⁷ Lin Tingyao (林庭瑤) and Ni Huairan (倪懷仁), “Exclusively Obtained Red-Letterhead Document: The Chinese Communist Party Concealed Wuhan Epidemic” (獨家取得紅頭文件: 中共隱瞞武漢疫情), *The Storm Media* (瘋傳媒), 15 April 2020.

⁹⁸⁸ Ibid. The quoted text is “有意不對繼續攀升的新冠疑似病人進行流調, 確診安排, 也未部署任何隔離措施.”

⁹⁸⁹ “China Delayed Releasing Coronavirus Info, Frustrating WHO,” *The Associated Press*, 02 June 2020.

⁹⁹⁰ The quoted text is “我們醫院門診擠滿大量住不進院的疑似病患, 有病人下跪哀求醫生收治他, 有的重症患者連爬上檯子拍 CT 的力氣都沒有, 顛顛巍巍的。” See, Lin Tingyao (林庭瑤) and Ni Huairan (倪懷仁), “Exclusively Obtained Red-Letterhead Document: The Chinese Communist Party Concealed Wuhan Epidemic” (獨家取得紅頭文件: 中共隱瞞武漢疫情), *The Storm Media* (瘋傳媒), 15 April 2020.

⁹⁹¹ Jane Parry, “China Coronavirus: Cases Surge as Official Admits Human to Human Transmission,” *The BJM*, 2020, 368: m236, published online on 20 January 2020.

⁹⁹² Ibid.

⁹⁹³ Sui-Lee Wee, “Japan and Thailand Confirm New Cases of Chinese Coronavirus,” *The New York Times*, 15 January 2020.

⁹⁹⁴ Jane Parry, “China Coronavirus: Cases Surge as Official Admits Human to Human Transmission,” *The BJM*, 2020, 368: m236, published online on 20 January 2020.

⁹⁹⁵ “China Didn’t Warn Public of Likely Pandemic for 6 Key Days,” *The Associated Press*, 15 April 2020.

⁹⁹⁶ Ibid.

⁹⁹⁷ Ibid.

⁹⁹⁸ The original post has been removed from the website of the Wuhan Municipal People’s Government. For a secondary source, see Jim Geraghty, “The Comprehensive Timeline of China’s COVID-19 Lies,” *National Review*, 23 March 2020.

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¹⁰⁰⁰ “China Didn’t Warn Public of Likely Pandemic for 6 Key Days,” *The Associated Press*, 15 April 2020.

¹⁰⁰¹ See, Xi Jinping (习近平), “Xi Jinping: Remarks to the Central Committee’s Politburo Standing Committee Meeting on Responding to the Novel Coronavirus Pneumonia Epidemic,” (习近平: 在中央政治局常委会会议研究应对新型冠状病毒肺炎疫情工作时的讲话), *Seeking Truth* (求是), 15 February 2020.

¹⁰⁰² “China Didn’t Warn Public of Likely Pandemic for 6 Key Days,” *The Associated Press*, 15 April 2020.

¹⁰⁰³ For full details of the changing case definition, see Table S1 in Tim K. Tsang, et. al., “Effect of Changing Case Definitions for COVID-19 on the Epidemic Curve and Transmission Parameters in Mainland China: a Modelling Study,” *The Lancet Public Health*, Volume 5, Issue 5, E289-E296, 01 MAY 2020, published online 21 April 2020.

¹⁰⁰⁴ The Wuhan Municipal Health Commission reported using “nucleic acid testing,” which like refers to PCR, at least as early as January 10, 2020. See Daniel R. Lucey, “Comments on Key Documents from the Early Weeks of SARS-CoV-2,” *Infectious Diseases Society of America* (Online), 24 August 2021. A European team had also developed a PCR test by January 13. See Victor Corman, et. al., “Diagnostic Detection of Wuhan Coronavirus 2019 by Real-Time RT-PCR,” *World Health Organization* (Online), 13 January 2020.

¹⁰⁰⁵ Tim K. Tsang, et. al., “Effect of Changing Case Definitions for COVID-19 on the Epidemic Curve and Transmission Parameters in Mainland China: a Modelling Study,” *The Lancet Public Health*, Volume 5, Issue 5, E289-E296, 01 MAY 2020, published online 21 April 2020.

¹⁰⁰⁶ Ibid.

¹⁰⁰⁷ The companies were GeneoDx Biotech, Huirui Biotechnology, and BioGerm Medical Technology. See Dake Kang, “China Testing Blunders Stemmed from Secret Deals with Firms,” *The Associated Press*, 03 December 2020.

¹⁰⁰⁸ Ibid.

¹⁰⁰⁹ Li Zhang, et. al., “Epidemiological and Clinical Characteristics of 99 Cases of Novel Coronavirus Pneumonia in Wuhan, China: a Descriptive Study,” *The Lancet*, Volume 395, Issue 10223, P507-513, 15 February 2020, published online on 30 January 2020.

¹⁰¹⁰ Dake Kang, “China Testing Blunders Stemmed from Secret Deals with Firms,” *The Associated Press*, 03 December 2020.

¹⁰¹¹ Sui-Lee Wee, "Japan and Thailand Confirm New Cases of Chinese Coronavirus," *The New York Times*, 15 January 2020.

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¹⁰¹³ Ibid.

¹⁰¹⁴ See, Zhuang Pinghui, Alice Yan, and Zoe Low, "China coronavirus: Beijing breaks its silence, but only to 'deny rumours'," *South China Morning Post*, 19 January 2020. Note that we know the claim that no cases could be found in hospitals outside of Wuhan was untrue because there were major cities, such as Guangzhou, that had documented cases by January 18. See, for example, the following study of Guangzhou hospitals that identified cases starting in January 15. Moran Dong, et. al., "Hospitalization Costs of COVID-19 Cases and Their Associated Factors in Guangdong, China: A Cross-Sectional Study," *Frontiers in Medicine*, 11 June 2021.

¹⁰¹⁵ "New Coronavirus 'Preventable and Controllable', China Says," *BBC News*, 19 January 2020.

¹⁰¹⁶ Yanan Wang and Ken Moritsugu, "Xi Jinping Warns That China's Coronavirus Outbreak Must Be Taken Seriously," *The Diplomat*, 21 January 2020.

¹⁰¹⁷ Winni Zhou, "'Enemy of Mankind': Coronavirus Deaths Top SARS as China Returns to Work," *Reuters*, 08 February 2020.

¹⁰¹⁸ James Kynge, "Wuhan Virus Points to Tough Year of the Rat for Xi Jinping," *Financial Times*, 23 January 2020; "40,000 Families Recount the Neighborly Feeling of Large Banquet in Wuhan Community" (武汉社区办万家宴 4万户家庭共叙邻里情), *Guancha Syndicate* (观察者), 21 January 2020.

¹⁰¹⁹ Ding Jie, He Jingwei, and Mo Yelin, "Weeks After Massive Local Party, Wuhan Neighborhood Remain in the Dark," *Caixin Global*, 11 February 2020.

¹⁰²⁰ The quoted text is "1月20日,我专门就疫情防控工作作出批示,指出必须高度重视疫情,全力做好防控工作,要求各级党委和政府及有关部门把人民群众生命安全和身体健康放在第一位,采取切实有效措施,坚决遏制疫情蔓延势头。" See, Xi Jinping (习近平), "Xi Jinping: Remarks to the Central Committee's Politburo Standing Committee Meeting on Responding to the Novel Coronavirus Pneumonia Epidemic" (习近平:在中央政治局常委会会议研究应对新型冠状病毒肺炎疫情工作时的讲话), *Seeking Truth* (求是), 15 February 2020.

¹⁰²¹ "Novel Coronavirus Infectious Pneumonia Epidemic: Person-to-Person Transmission and Infection of Medical Personnel has Already Been Confirmed" (新型冠状病毒感染肺炎疫情:已确认存在人传人和医务人员感染), *Xinhua News Agency*, 20 January 2020; Javier C. Hernandez and Austin Ramzy, "China Confirms New Coronavirus Spreads From Humans to Humans," *New York Times*, 20 January 2020.

¹⁰²² Liu Jie, Wang Pan, and Xiao Sisi, "Profile: Zhong Nanshan: outspoken doctor awarded China's top honor," *XinhuaNet*, 08 September 2020.

¹⁰²³ Emphasis added. The quote is taken from this sentence: "目前疫情在武汉出现局部暴发的情况。" "Novel Coronavirus Infectious Pneumonia Epidemic: Person-to-Person Transmission and Infection of Medical Personnel has Already Been Confirmed" (新型冠状病毒感染肺炎疫情:已确认存在人传人和医务人员感染), *Xinhua News Agency*, 20 January 2020.

¹⁰²⁴ Ibid. The quote is "我不相信它会像17年前非典造成的社会影响以及经济的损害。"

¹⁰²⁵ "China Delayed Releasing Coronavirus Info, Frustrating WHO," *The Associated Press*, 02 June 2020.

¹⁰²⁶ The relevant statement is "从感染人群的地理分布看,与武汉海鲜市场关系很密切。" "Novel Coronavirus Infectious Pneumonia Epidemic: Person-to-Person Transmission and Infection of Medical Personnel has Already Been Confirmed" (新型冠状病毒感染肺炎疫情:已确认存在人传人和医务人员感染), *Xinhua News Agency*, 20 January 2020.

¹⁰²⁷ Don Tse and Larry Ong, "Coronavirus Pushes CCP Factional Struggle to Inflection Point," *SinoInsider*, April 2020, pg. 14.

¹⁰²⁸ Qun Li, et. al., "Early Transmission Dynamics in Wuhan, China, of Novel Coronavirus-Infected Pneumonia," *The New England Journal of Medicine*, 2020, 382:1199-1207, print version published on 26 March 2020, online version published on 29 January 2020.

¹⁰²⁹ The original post has been removed from the website of the Wuhan Municipal People's Government. For a secondary source, see Jim Geraghty, "The Comprehensive Timeline of China's COVID-19 Lies," *National Review*, 23 March 2020.

¹⁰³⁰ Zheng-li Shi, et al., “A Pneumonia Outbreak Associated with a New Coronavirus of Probable Bat Origin,” *Nature*, Volume 579, pages 270–273 (2020), received 20 January 2020, accepted 29 January 2020, published online on 03 February 2020.

¹⁰³¹ Ibid.

¹⁰³² Ibid. Emphasis added to the word “then” to highlight how the word choice suggests that the WIV’s work on RaTG13 was subsequent to its sequencing of SARS-CoV-2 when, as we will see, RaTG13 was simply another name for BtCoV/4991, which they collected in 2013.

¹⁰³³ The missing citation immediately caught the eye of one science writer. See, Alina Chan and Matt Ridley, *Viral: The Search for the Origin of COVID-19*, (Harper Collins Publishers: New York, November 2021), pg. 27-28.

¹⁰³⁴ Zheng-li Shi, et al., “A Pneumonia Outbreak Associated with a New Coronavirus of Probable Bat Origin,” *Nature*, Volume 579, pages 270–273 (2020), received 20 January 2020, accepted 29 January 2020, published online on 03 February 2020.

¹⁰³⁵ Alina Chan and Matt Ridley, *Viral: The Search for the Origin of COVID-19*, (Harper Collins Publishers: New York, November 2021), pg. 27-29, 33.

¹⁰³⁶ Ibid, pg. 32.

¹⁰³⁷ “Seven Year Coronavirus Trail From Bat Cave via Wuhan Lab,” *The Sunday Times*, 04 July 2020.

¹⁰³⁸ Ibid.

¹⁰³⁹ Ed Browne, “Peter Daszak, Who Sought U.S. Funds for Wuhan Lab and Aided Cover-up, Faces Calls to Quit,” *Newsweek*, 06 October 2021.

¹⁰⁴⁰ “Bats, Snakes or Pangolins? Inside the Hunt for the Animal Behind the Coronavirus Outbreak,” *Wired UK*, 16 February 2020.

¹⁰⁴¹ Jennifer Khan, “How Scientists Could Stop the Next Pandemic Before it Starts,” *New York Times Magazine*, 21 April 2020.

¹⁰⁴² “Seven Year Coronavirus Trail From Bat Cave via Wuhan Lab,” *The Sunday Times*, 04 July 2020.

¹⁰⁴³ Ibid.

¹⁰⁴⁴ Alina Chan and Matt Ridley, *Viral: The Search for the Origin of COVID-19*, (Harper Collins Publishers: New York, November 2021), pg. 32.

¹⁰⁴⁵ “Reply to Science Magazine,” *Science Magazine*, 31 July 2020, Volume 369, Issue 6503, pg. 7.

¹⁰⁴⁶ Alina Chan and Matt Ridley, *Viral: The Search for the Origin of COVID-19*, (Harper Collins Publishers: New York, November 2021), pg. 28-31. They are Dr. Rossana Segreto of the University of Innsbruck and Prasenjit Ray, a science teacher in India.

¹⁰⁴⁷ Ibid, pg. 33.

¹⁰⁴⁸ “Mission Summary: WHO Field Visit to Wuhan, China 20-21 January 2020,” *The World Health Organization*, 22 January 2020.

¹⁰⁴⁹ Ibid.

¹⁰⁵⁰ Ibid.

¹⁰⁵¹ The quote was extracted from the following text: “1月22日, 鉴于疫情迅速蔓延, 防控工作面临严峻挑战, 我明确要求湖北省对人员外流实施全面严格管控。” See, “Xi Jinping, “Speech at the Meeting of the Standing Committee of the Political Bureau of the CCP Central Committee to Study the Response to the Novel Coronavirus Pneumonia Epidemic,” (在中央政治局常委会会议研究应对新型冠状病毒肺炎疫情工作时的讲话), *Seeking Truth* (求是), 15 February 2020.

¹⁰⁵² “Timeline: China’s COVID-19 Outbreak and Lockdown of Wuhan,” *The Associated Press*, 22 January 2021.

¹⁰⁵³ Ibid.

¹⁰⁵⁴ “General Office of the National Health Commission Circular on the Laboratory Biosafety Guidelines for the Novel Coronavirus (Second Edition)” (国家卫生健康委办公厅关于印发新型冠状病毒实验室生物安全指南 (第二版)的通知), *National Health Commission of the People’s Republic of China*, NHC 2020 Document No. 70, 23 January 2020.

¹⁰⁵⁵ The quoted text is “为保障新型冠状病毒感染的肺炎防控工作期间实验室生物安全, 国家卫生健康委组织制定了新型冠状病毒实验室生物安全指南, 指导各地规范开展新型冠状病毒相关实验活动。” See, “Interpreting the Laboratory Biosafety Guidelines for the Novel Coronavirus (Second Edition)” (解读 新型冠状病毒实验室生物安全指南, 第二版), *National Health Commission of the People’s Republic of China* (Online), 23 January 2020.

¹⁰⁵⁶ The quoted text is “病毒培养: 指病毒的分离, 培养, 滴定, 中和试验, 活病毒及其蛋白纯化, 病毒冻干以及产生活病毒的重组实验等操作. 上述操作应当在生物安全三级实验室内进行. 使用病毒培养物提取核酸, 裂解剂或灭活剂的加入必须在与病毒培养等同类别的实验室和防护条件下进行...实验室开展相关活动前, 应当报经国家卫生健康委批准, 取得开展相应活动的资质.” “General Office of the National Health Commission Circular on the Laboratory Biosafety Guidelines for the Novel Coronavirus (Second Edition)” (国家卫生健康委办公厅关于印发新型冠状病毒实验室生物安全指南 (第二版) 的通知), *National Health Commission of the People's Republic of China* (Online), NHC 2020 Document No. 70, 23 January 2020.

¹⁰⁵⁷ Ibid. The quoted text is “活病毒感染动物、感染动物取样、感染性样本处理和检测、感染动物特殊检查、感染动物排泄物处理等实验操作.”

¹⁰⁵⁸ Ibid. The Chinese text which we paraphrased is: “(三) 未经培养的感染性材料的操作: 指未经培养的感染性材料在采用可靠的方法灭活前进行的病毒抗原检测, 血清学检测, 核酸提取, 生化分析, 以及临床样本的灭活等操作, 应当在生物安全二级实验室进行, 同时采用生物安全三级实验室的个人防护... 分子克隆等不含致病性活病毒的其他操作, 可以在生物安全一级实验室进行.”

¹⁰⁵⁹ Ibid. Emphasis added. The quoted text is “新型冠状病毒毒株和相关样本应当由专人管理, 准确记录毒株和样本的来源, 种类, 数量, 编号登记, 采取有效措施确保毒株和样本的安全, 严防发生误用, 恶意使用, 被盗, 被抢, 丢失, 泄露等事件.”

¹⁰⁶⁰ Ibid. Emphasis added. The quoted text is “实验室生物安全操作失误或意外的处理.”

¹⁰⁶¹ Ibid. The quoted text is “新型冠状病毒毒株或其他潜在感染性材料污染生物安全柜的操作台造成局限污染: 使用有效氯含量为 0.55% 消毒液, 消毒液需要现用现配, 24 小时内使用.”

¹⁰⁶² Ibid. The quoted text is “清理污染物严格遵循活病毒生物安全操作要求, 采用压力蒸汽灭菌处理, 并进行实验室换气等, 防止次生危害.”

¹⁰⁶³ Ibid. The quoted text is “含病毒培养器皿碎裂或倾覆造成实验室污染: 保持实验室空间密闭, 避免污染物扩散, 使用 0.55% 有效氯消毒液的毛巾覆盖污染区. 必要时(大量溢撒时) 可用过氧乙酸加热熏蒸实验室, 剂量为 2g/m³, 熏蒸过夜; 或 20g/L 过氧乙酸消毒液用气溶胶喷雾器喷雾, 用量 8ml/m³, 作用 1 ~ 2 小时; 必要时或用高锰酸钾-甲醛熏蒸: 高锰酸钾 8g/m³, 放入耐热耐腐蚀容器 (陶罐或玻璃容器), 后加入甲醛 (40%) 10ml/m³, 熏蒸 4 小时以上. 熏蒸时室内湿度 60%-80%.”

¹⁰⁶⁴ Ibid. The Chinese text that was paraphrased is: “(一) 开展新型冠状病毒相关实验活动的实验室应当制定废弃物处置程序文件及污物, 污水处理操作程序. (二) 所有的危险性废弃物必须依照统一规格化的容器和标示方式, 完整并且合规地标示废弃物内容. (三) 应当由经过适当培训的人员使用适当的个人防护装备和设备处理危险废弃物. (四) 废弃物的处理措施: 废弃物的处理是控制实验室生物安全的关键环节, 切实安全地处理感染性废弃物, 必须充分掌握生物安全废弃物的分类, 并严格执行相应的处理程序.”

¹⁰⁶⁵ Ibid. The quoted text is “经处理达标后方可排放.”

¹⁰⁶⁶ Ibid. The quoted text is “工作人员应当及时处理废弃物, 不得将废弃物带出实验区.”

¹⁰⁶⁷ Ibid. The quoted text is “固体废物分类收集, 固体废物的收集容器应当具有不易破裂, 防渗漏, 耐湿耐热, 可密封等特性. 实验室内的感染性垃圾不允许堆积存放, 应当及时压力蒸汽灭菌处理. 废物处置之前, 应当存放在实验室内指定的安全地方.”

¹⁰⁶⁸ Ibid. The quoted text is “小型固体废物如组织标本, 耗材, 个人防护装备等均需经过压力蒸汽灭菌处理, 再沿废弃物通道移出实验室.”

¹⁰⁶⁹ Ibid. The quoted text is “体积较大的固体废物如 HEPA 过滤器, 应当由专业人士进行原位消毒后, 装入安全容器内进行消毒灭菌. 不能进行压力蒸汽灭菌的物品如电子设备可以采用环氧乙烷熏蒸消毒处理.”

¹⁰⁷⁰ Ibid. The quoted text is “经消毒灭菌处理后移出实验室的固体废物, 集中交由固体废物处理单位处置.”

¹⁰⁷¹ Ibid. The quoted text is “实验过程如使用锐器 (包括针头, 小刀, 金属和玻璃等) 要直接弃置于锐器盒内, 高压灭菌后, 再做统一处理.”

¹⁰⁷² Ibid. The quoted text is “建立废弃物处理记录: 定期对实验室排风 HEPA 过滤器进行检漏和更换, 定期对处理后的污水进行监测, 采用生物指示剂监测压力蒸汽灭菌效果.”

¹⁰⁷³ For example, see “Keep Firmly in Mind Your Responsibilities, Hold Fast to the Mission, Be a Pioneer for our Nation in the Realm of High-Level Biosafety – The Achievements of the Zhengdian Lab Party Branch of the Chinese

Academy of Sciences Wuhan Institute of Virology (牢记责任， 坚守使命 做我国高等级生物安全领域的开拓者——中科院武汉病毒所郑店实验室党支部事迹), *Wuhan Institute of Virology* (Online), 12 November 2019.

¹⁰⁷⁴ The original text from which these claims were derived is “课程内容涵盖了国家生物安全法律法规及标准, 高等级生物安全实验室管理体系, 实验室生物安全风险评估方法, 菌毒种保藏, 动物实验以及实验室废弃物处理等内容.” See, “Wuhan Institute of Virology Holds 2019 Training Class on Biosafety Laboratory Management and Techniques for Conducting Experiments” (武汉病毒所举办 2019 年生物安全实验室管理与实验技术培训班), *Wuhan Institute of Virology* (Online), 28 November 2019.

¹⁰⁷⁵ See, “Announcement of Deal Reached for Project to Renovate the Hazardous Waste Management System at the Zhengdian Campus of the Chinese Academy of Sciences Wuhan Institute of Virology” (中国科学院武汉病毒研究所郑店园区危废处理系统改造工程成交公告), *Chinese Government Procurement Network* (中国政府采购网), 31 July 2019. Thanks to the DRASTIC Research Group for locating this document and archiving it.

<https://archive.ph/3CW03#selection-149.0-152.0>

¹⁰⁷⁶ “Wuhan Institute of Virology Convenes Safety, Record-Keeping Work Conference” (武汉病毒所召开安全, 档案工作会议), *Wuhan Institute of Virology* (Online), 07 January 2020. For example, the WIV leadership told researchers: “任何时候都不能对安全工作掉以轻心, 必须进一步强化安全责任落实, 强化安全隐患整改, 强化危化品使用管理, 兢兢业业, 尽职尽责做好安全的各项工作,” and “做好全年的安全、档案工作至关重要.”

¹⁰⁷⁷ Rowan Jacobsen, “Inside the Risky Bat-Virus Engineering that Links America to Wuhan,” *MIT Technology Review*, 29 June 2021.

¹⁰⁷⁸ Kwok-Yung Yuen, et. al., “A Familial Cluster of Pneumonia Associated with the 2019 Novel Coronavirus Indicating Person-to-Person Transmission: A Study of a Family Cluster,” *The Lancet*, Volume 395, Issue 10223, P514-523, 15 February 2020, published online on 24 January 2020.

¹⁰⁷⁹ Ibid.

¹⁰⁸⁰ For example, four days after the Lancet study was published, Anthony Fauci, director of the U.S. National Institute of Allergy and Infectious Diseases, downplayed concerns about asymptomatic transmission: “In all the history of respiratory-borne viruses of any type, asymptomatic transmission has never been the driver of outbreaks... Even if there’s a rare asymptomatic person that might transmit, an epidemic is not driven by asymptomatic carriers.” Daniel P. Oran and Eric J. Topol, “The Day We Let Covid-19 Spin Out of Control,” *STAT News*, 23 January 2021.

¹⁰⁸¹ Pratha Sah, Meagan C. Fitzpatrick, Charlotte F. Zimmer, Elaheh Abdollahi, Lyndon Juden-Kelly, Seyed M. Moghadas, Burton H. Singer, and Alison P. Galvani, “Asymptomatic SARS-CoV-2 Infection: A Systematic Review and Meta-Analysis,” *Proceedings of the National Academy of Sciences of the United States of America* (PNAS), Vol. 118, No. 34, published online on 10 August 2021.

¹⁰⁸² Claude P. Muller, “Do Asymptomatic Carriers of SARS-CoV-2 Transmit the Virus?,” *The Lancet: Regional Health Europe*, Volume 4, 100082, 01 May 2021, published online on 20 March 2021.

¹⁰⁸³ Bin Cao, Jianwei Wang, et. al., “Clinical Features of Patients Infected with 2019 Novel Coronavirus in Wuhan, China,” *The Lancet*, Volume 395, Issue 10223, P497-506, February 15, 2020, published online on 24 January 2020.

¹⁰⁸⁴ Ibid, see in particular “Figure 1: Date of illness onset and age distribution of patients with laboratory-confirmed 2019-nCoV infection.”

¹⁰⁸⁵ Ibid.

¹⁰⁸⁶ Ibid.

¹⁰⁸⁷ The other Politburo Standing Committee meeting ostensibly occurred on January 7, but it was never reported in detail and not mentioned publicly until Xi’s speech given on February 3 was published by *Qiushi* on February 15. See later entry in this chronology. The quoted text is “会议强调, 湖北省武汉市等地近期陆续发生新型冠状病毒感染的肺炎疫情以来, 习近平总书记始终高度重视, 多次召开会议, 多次听取汇报, 作出重要指示...” See “The Politburo Standing Committee of the Central Committee of the Chinese Communist Party Held Meeting to Study the Prevention and Control of Pneumonia Caused by Novel Coronavirus Infections; General Secretary Xi Jinping Presided over the Meeting” (中共中央政治局常务委员会召开会议 研究新型冠状病毒感染的肺炎疫情防控工作 中共中央总书记习近平主持会议), *Xinhua News Agency*, 25 January 2020.

¹⁰⁸⁸ Ibid. The quoted text is “维护社会大局稳定.”

¹⁰⁸⁹ Another official report revealed that Xi emphasized support for him personally a priority of the epidemic response, appealing to local officials to “earnestly unify your thinking and actions with the decisions and

deployments made by Comrade Xi Jinping as the core of the Party Central” (切实把思想和行动统一到以习近平同志为核心的党中央的决策部署上来), and to “resolutely accomplish the Two Upholds,” (坚决做到 “两个维护”). The “Two Upholds” is a political doctrine that maintains that the primary duty of all CCP cadres is to “resolutely uphold Comrade Xi Jinping’s core position on the Central Committee, and in the Party as a whole, and resolutely uphold the Central Committee’s authority and its centralized, unified leadership.” See, “The Leading Group for Responding to the Novel Coronavirus Pneumonia Epidemic of the Central Cyberspace Administration of China Held a Meeting to Convey and Study the Spirit of the Meeting of the Standing Committee of the Political Bureau of the CPC Central Committee”(中央网信办应对处置新型冠状病毒感染的肺炎疫情工作领导小组召开会议 传达学习中央政治局常委会会议精神), the *Central Cyberspace Administration of China* (Online), 26 January 2020.

¹⁰⁹⁰ Ibid. The quoted text is “把疫情防控工作作为当前首要的政治任务... 举全办, 全系统之力切实做好疫情防控网上宣传引导工作...”

¹⁰⁹¹ Ibid. The quoted text is “推动网上形成众志成城...” and “营造网上良好氛围.”

¹⁰⁹² “Li Keqiang Chairs Meeting to Launch the Central Leading Small Group for Work to Counter the New Coronavirus Infectious Pneumonia Epidemic” (李克强主持召开中央应对新型冠状病毒感染肺炎疫情工作领导小组会议), *Xinhua News Agency*, 26 January 2020. The relevant text is “中央应对新型冠状病毒感染肺炎疫情工作领导小组成员丁薛祥, 孙春兰, 黄坤明, 蔡奇, 王毅, 肖捷, 赵克志参加会议.”

¹⁰⁹³ For Sun’s biography, see “Sun Chunlan,” *China Vitae*, last accessed on 19 March 2022.

¹⁰⁹⁴ “Li Keqiang Chairs Meeting to Launch the Central Leading Small Group for Work to Counter the New Coronavirus Infectious Pneumonia Epidemic” (李克强主持召开中央应对新型冠状病毒感染肺炎疫情工作领导小组会议), *Xinhua News Agency*, 26 January 2020. For more on Zhao, see Tristan Kenderdine, “Zhao Kezhi’s Legacy Could Define China’s Regional Security Paradigm,” *The Diplomat*, 12 April 2021.

¹⁰⁹⁵ Congressional-Executive Commission on China, “Institutions of Democratic Governance,” *2020 Annual Report*, One Hundred Sixteenth Congress, Second Session, December 2020, p. 9.

¹⁰⁹⁶ See “The General Office of the State Council Issues Notice Regarding the Formation of the National Command Center for Preventing the SARS Pneumonia,” (国务院办公厅关于成立全国防治非典型肺炎指挥部的通知), *Central Government of the People’s Republic of China* (Online), PRC State Council 2003 Document No. 25, 28 April 2003.

¹⁰⁹⁷ “Xiao Juhua Investigates and Studies the Wuhan Institute of Virology and Directs the Emergency Response R&D Campaign for the 2019 Novel Coronavirus Pneumonia Epidemic” (肖菊华调研武汉病毒所并部署应对 2019 新型冠状病毒肺炎疫情应急科研攻关), *Wuhan Institute of Virology* (Online), 29 January 2020.

¹⁰⁹⁸ Ibid. The quoted text is “加强溯源和病原学检测分析, 加快治疗药品和疫苗研发.”

¹⁰⁹⁹ Ibid. The quoted text is “她强调, 在科研攻关过程中需协调的事项, 按照 ‘一事一报, 特事特办’ 的原则, 及时运转, 打通 ‘障碍’, 实现高效推进.”

¹¹⁰⁰ See Table S1 in Tim K. Tsang, et. al., “Effect of Changing Case Definitions for COVID-19 on the Epidemic Curve and Transmission Parameters in Mainland China: a Modelling Study,” *The Lancet Public Health*, Volume 5, Issue 5, E289-E296, 01 MAY 2020, published online 21 April 2020.

¹¹⁰¹ John Xie, “In China, Officials Exclude Asymptomatic COVID-19 Carriers From Data,” *Voice of America*, 28 March 2020.

¹¹⁰² Table S1 in Tim K. Tsang, et. al., 21 April 2020.

¹¹⁰³ John Xie, “In China, Officials Exclude Asymptomatic COVID-19 Carriers From Data,” *Voice of America*, 28 March 2020.

¹¹⁰⁴ Ibid.

¹¹⁰⁵ Qun Li, et. al., “Early Transmission Dynamics in Wuhan, China, of Novel Coronavirus-Infected Pneumonia,” *The New England Journal of Medicine*, 2020; 382:1199-1207, print publication on 26 March 2020, published online on 29 January 2020.

¹¹⁰⁶ Don Tse and Larry Ong, “Coronavirus Pushes CCP Factional Struggle to Inflection Point,” *SinoInsider*, April 2020, p. 97.

¹¹⁰⁷ Mu Chunshan, “Why Do Some Chinese Still Love Bo Xilai?,” *The Diplomat*, 06 August 2013.

¹¹⁰⁸ “General Office of the Ministry of Science and Technology Circular on Doing a Good Job with Novel Coronavirus Epidemic Prevention and Control Services for Foreign Experts Working in China” (科技部办公厅关于做好在华工作

外国专家防控新型冠状病毒疫情服务工作的通知), the *Ministry of Science and Technology of the People's Republic of China* (Online), MOST 2020 Document No. 4, 31 January 2020.

¹¹⁰⁹ Ibid. The quoted text is “有效引导, 提振信心, 通过官方权威渠道开展宣传, 引导外国专家不信谣不传谣.”

¹¹¹⁰ James Griffiths, “China Says Xi Jinping is Directing its Wuhan Coronavirus Response, But He’s Nowhere to be Seen,” *CNN*, 05 February 2020.

¹¹¹¹ Don Tse and Larry Ong, “Coronavirus Pushes CCP Factional Struggle to Inflection Point,” *SinoInsider*, April 2020, p. 44.

¹¹¹² Tsukasa Hadano and Tomoya Onishi, “‘A Friend in Need is a Friend Indeed,’ Xi tells Visiting Hun Sen,” *Nikkei Asia*, 06 February 2020.

¹¹¹³ James Griffiths, “Xi’s Reemergence Shows How Carefully China is Controlling the Coronavirus Narrative,” *CNN*, 11 February 2020.

¹¹¹⁴ Katherine Eban, “The Lab Leak Theory: Inside the Fight to Uncover COVID-19’s Origins,” *Vanity Fair*, 03 June 2021.

¹¹¹⁵ Don Tse and Larry Ong, “Coronavirus Pushes CCP Factional Struggle to Inflection Point,” *SinoInsider*, April 2020, p. 15.

¹¹¹⁶ See, Jane Qiu, “How China’s ‘Bat Woman’ Hunted Down Viruses from SARS to the New Coronavirus,” *Scientific American*, 11 March 2020.

¹¹¹⁷ Don Tse and Larry Ong, “Coronavirus Pushes CCP Factional Struggle to Inflection Point,” *SinoInsider*, April 2020, p. 15.

¹¹¹⁸ Sharri Markson, *What Really Happened in Wuhan*, (Sydney, Australia: HarperCollins Publishers, September 2021), pg. 366; Don Tse and Larry Ong, Don Tse and Larry Ong, “Coronavirus Pushes CCP Factional Struggle to Inflection Point,” *SinoInsider*, April 2020, pg. 16.

¹¹¹⁹ Don Tse and Larry Ong, “Coronavirus Pushes CCP Factional Struggle to Inflection Point,” *SinoInsider*, April 2020, pg. 16.

¹¹²⁰ Some observers (Tse and Ong) suggest that Wu was likely using a pseudonym, while others (Markson) raise the possibility that Wu was detained, or worse, for her posts. See Markson, p. 366, and Tse and Ong, p. 16.

¹¹²¹ Don Tse and Larry Ong, “Coronavirus Pushes CCP Factional Struggle to Inflection Point,” *SinoInsider*, April 2020, pg. 16.

¹¹²² Sharri Markson, *What Really Happened in Wuhan*, (Sydney, Australia: HarperCollins Publishers, September 2021), p. 368.

¹¹²³ Jinsung Yang, Simon J.L. Petitjean, Melanie Koehler, et al., “Molecular interaction and inhibition of SARS-CoV-2 binding to the ACE2 receptor,” *Nature Communications*, Volume 11, Article No. 4541, 11 September 2020.

¹¹²⁴ Xi Jinping (习近平), “Xi Jinping: Remarks to the Central Committee’s Politburo Standing Committee Meeting on Responding to the Novel Coronavirus Pneumonia Epidemic” (习近平：在中央政治局常委会会议研究应对新型冠状病毒肺炎疫情防控工作时的讲话) *Seeking Truth* (求是), 15 February 2020.

¹¹²⁵ Ibid.

¹¹²⁶ Ibid. The quoted text is “从年初一到现在, 疫情防控是我最关注的问题, 我时刻跟踪着疫情蔓延形势和防控工作进展情况, 不断作出口头指示和批示.”

¹¹²⁷ Ibid. The quoted text is “人民战争” and “全国形成了全面动员.” For more information on the meaning of a “people’s war,” see Guan Kai, “People’s War,” in *Afterlives of Chinese Communism*, Christian Sorace, et. al., eds., Australian National University Press: Canberra, 2019, pg. 175-180.

¹¹²⁸ Ibid. The quoted text is “总的看, 党中央对疫情形势的判断是准确的, 各项工作部署是及时的, 采取的举措也是有效的.”

¹¹²⁹ Ibid. The quoted text is “我在会见世界卫生组织总干事谭德塞时, 谭德塞表示, 中方行动速度之快, 规模之大, 世所罕见, 这是中国的制度优势, 有关经验值得其他国家借鉴, 相信中国采取的措施将有效控制并最终战胜疫情.”

¹¹³⁰ Ibid. The quoted text is “疫情防控要坚持全国一盘棋. 各级党委和政府必须坚决服从党中央统一指挥, 统一协调, 统一调度, 做到令行禁止.”

¹¹³¹ Ibid. Emphasis added. Readers will recall that Xi’s reference to “shortcomings” echoes numerous WIV reports from 2019. The quoted text is “也存在一些薄弱环节和值得注意的问题, 必须抓紧补短板, 堵漏洞.”

¹¹³² Ibid.

¹¹³³ Ibid. The quoted text is “战胜疫病离不开科技支撑. 要科学论证病毒来源, 尽快查明传染源和传播途径, 密切跟踪病毒变异情况, 及时研究防控策略和措施.”

¹¹³⁴ Ibid. The quoted text is “对相关数据和病例资料等, 除有法律规定需要保密的外, 在做好国家安全工作的条件下, 要向我国科技界开放共享, 组织临床医学, 流行病学, 病毒学等方面的专家, 研究病毒传播力, 毒性等关键特性, 尽快拿出切实管用的研究成果.”

¹¹³⁵ For more information on the stability maintenance system in China, see Willy Wo-Lap Lam, “‘Stability Maintenance’ Gets a Major Boost at the National People’s Congress,” *China Brief*, Volume 19, Issue 6, *Jamestown Foundation*, 22 March 2019; Juan Wang, “Managing Social Stability: The Perspective of a Local Government in China,” *Journal of East Asian Studies*, Volume 15, No. 1, January-April 2015, pg. 1-25; and Anna Mitchell and Larry Diamond, “China’s Surveillance State Should Scare Everyone,” *The Atlantic*, 02 February 2018.

¹¹³⁶ The quoted text is “全力维护正常经济社会秩序.” Xi Jinping (习近平), “Xi Jinping: Remarks to the Central Committee’s Politburo Standing Committee Meeting on Responding to the Novel Coronavirus Pneumonia Epidemic” (习近平：在中央政治局常委会会议研究应对新型冠状病毒肺炎疫情工作时的讲话) *Seeking Truth* (求是), 15 February 2020.

¹¹³⁷ Ibid. The quoted text is “要加大警力投入, 强化显性用警, 全面落实公安武警联勤联动联防联控机制, 提高见警率, 管事率. 要保持严打高压态势.”

¹¹³⁸ Ibid. The quoted text is “当前疫情防控形势严峻复杂, 一些群众存在焦虑, 恐惧心理, 宣传舆论工作要加大力度, 统筹网上网下, 国内国际, 大事小事, 更好强信心, 暖人心, 聚民心, 更好维护社会大局稳定.”

¹¹³⁹ Ibid. The quoted text is “着力稳定公众情绪.”

¹¹⁴⁰ Ibid. The quoted text is “要把控好整体舆论, 努力营造良好舆论环境. 要加强网络媒体管控... 对借机造谣滋事的, 要依法打击处理.”

¹¹⁴¹ Ibid. The quoted text is “占据主动, 有效影响国际舆论... 讲好中国抗击疫情故事...”

¹¹⁴² Ibid. The quoted text is “这次疫情是对我国治理体系和能力的一次大考, 我们一定要总结经验, 吸取教训. 要针对这次疫情应对中暴露出来的短板和不足, 健全国家应急管理体系, 提高处理急难险重任务能力.”

¹¹⁴³ Ibid. The quoted text is “这次疫情暴露出我们在城市公共环境治理方面还存在短板死角, 要进行彻底排查整治, 补齐公共卫生短板.”

¹¹⁴⁴ Ibid. The quoted text is “这次疫情暴露出重点卫生防疫物资 (如防护服等) 储备严重不足.”

¹¹⁴⁵ Ibid. The quoted text is “我们早就认识到, 食用野生动物风险很大, 但 ‘野味产业’ 依然规模庞大, 对公共卫生安全构成了重大隐患. 再也不能无动于衷了! 我已经就这个问题作出了批示. 有关部门要加强法律实施, 加强市场监管, 坚决取缔和严厉打击非法野生动物市场和贸易, 坚决革除滥食野生动物的陋习, 从源头上控制重大公共卫生风险.”

¹¹⁴⁶ Ibid. The quoted text is “还要抓紧出台生物安全法等法律.”

¹¹⁴⁷ Of the 10 chapters and 88 articles contained in the Biosecurity Law, only one article, Article 32, deals with animal borne diseases, and it is completely lacking in detail. It simply states “The state protects wild animals and strengthens animal epidemic prevention to prevent the spread of infectious diseases derived from animals” (国家保护野生动物加强动物防疫防止动物源性传染病传播). By contrast, all of Chapter Five deals with biosafety at laboratories studying highly pathogenic microorganisms. See “The Biosecurity Law of the People’s Republic of China” (中华人民共和国生物安全法), *The National People’s Congress of the People’s Republic of China* (Online), 17 October 2020.

¹¹⁴⁸ Xu Zhangrun (許章潤), “Viral Alert: When Fury Overcomes Fear,” translated and annotated by Geremie R. Barmé, *ChinaFile*, 10 February 2020.

¹¹⁴⁹ Ibid.

¹¹⁵⁰ Ibid.

¹¹⁵¹ Ibid. Emphasis added. Note that when Professor Xu writes “It began with the imposition of stern bans on the reporting of accurate information about the virus,” he is most likely referring to the nationwide gag order issued by the National Health Commission on January 3.

¹¹⁵² See Table S1 in Tim K. Tsang, et. al., “Effect of Changing Case Definitions for COVID-19 on the Epidemic Curve and Transmission Parameters in Mainland China: a Modelling Study,” *The Lancet Public Health*, Volume 5, Issue 5, E289-E296, 01 MAY 2020, published online 21 April 2020.

¹¹⁵³ These clinical symptoms were 1. fever and/or respiratory symptoms, 2. pneumonia indicated by chest radiograph, and 3. low or normal white blood cell count, or low lymphocyte count during early onset.

¹¹⁵⁴ The four epidemiological links were: (1) travel to, or had lived in Wuhan or the surrounding areas or other communities with reported COVID-19 cases, within 14 days before illness onset, (2) contact with patient(s) infected with SARS-CoV-2 (positive for SARS-CoV-2 nucleic acid) within 14 days before onset, (3) contact with patients with fever or respiratory symptoms from Wuhan or the surrounding areas, or from communities with reported COVID-19 cases, within 14 days before illness onset, and (4) had a clustering occurrence.

¹¹⁵⁵ Table S1 in Tim K. Tsang, et. al., 21 April 2020.

¹¹⁵⁶ John Xie, "In China, Officials Exclude Asymptomatic COVID-19 Carriers From Data," *Voice of America*, 28 March 2020.

¹¹⁵⁷ Nectar Gan and Natalie Thomas, "Chen Qiushi Spoke Out About the Wuhan Virus. Now People Fear He's Been Silenced," *CNN*, 10 February 2020.

¹¹⁵⁸ *Ibid.*

¹¹⁵⁹ Geremie R. Barmé, "How Steel is Tempered: Chen Qiushi Returns," *China Heritage*, 06 October 2021.

¹¹⁶⁰ "Chen Qiushi: Chinese Journalist Missing Since February 'Under State Supervision'," *BBC News*, 24 September 2020.

¹¹⁶¹ Keith Zhai, "Chinese Citizen Journalist Who Documented Covid-19 in Wuhan Resurfaces After 600 Days," *The Wall Street Journal*, 01 October 2021.

¹¹⁶² "Li Wenliang: Coronavirus Death of Wuhan Doctor Sparks Anger," *BBC News*, 07 February 2020.

¹¹⁶³ *Ibid.* Gerry Shih, "Doctor's death from coronavirus sparks a digital uprising, rattling China's leaders," *The Washington Post*, 07 February 2020.

¹¹⁶⁴ Joy Dong, "Two Years After His Death, the Chinese Doctor who Warned of the Virus is Remembered," *The New York Times*, 07 February 2022.

¹¹⁶⁵ Julia Hollingsworth and Yong Xiong, "China's Truth-tellers: China Created a Story of the Pandemic. These People Revealed Details Beijing Left Out," *CNN*, 15 February 2021.

¹¹⁶⁶ "Coronavirus: Why Have Two Reporters in Wuhan Disappeared?," *BBC News*, 14 February 2020.

¹¹⁶⁷ "Fang Bin, COVID-19 Whistleblower and Falun Gong Practitioner, Detained in Wuhan," *Falun Dafa Information Center*, 24 March 2022.

¹¹⁶⁸ They were the Ministry of Agriculture and Rural Affairs, Ministry of Education, Ministry of Science and Technology, the National Health Commission, the General Administration of Customs, the National Forestry and Grasslands Administration, and the Chinese Academy of Sciences.

¹¹⁶⁹ See the Ministry of Agriculture and Rural Affairs (2020 No. 15), Ministry of Education, Ministry of Science and Technology, the National Health Commission, the General Administration of Customs, the National Forestry and Grasslands Administration, and the Chinese Academy of Sciences, "Circular on Strengthening Biosecurity and Biosafety Management of Animal Pathogen Molecular Biology Labs" (关于加强动物病原微生物实验室生物安全管理的通知), *Chinese Academy of Sciences* (Online), issued on 09 February 2020, posted online on 02 March 2020.

¹¹⁷⁰ *Ibid.* The quoted text is "为深入贯彻落实总体国家安全观, 切实推进国家生物安全, 进一步加强动物病原微生物实验室生物安全管理."

¹¹⁷¹ *Ibid.* The quoted text is "病原微生物实验室生物安全是国家生物安全的重要组成部分."

¹¹⁷² *Ibid.* The quoted text is "部分实验室生物安全管理工作仍存在一些问题和隐患. 各地各有关部门要切实增强做好病原微生物实验室生物安全管理的安全感和使命感, 强化安全意识, 健全管理措施, 落实管理责任, 有效防范和化解实验室生物安全风险."

¹¹⁷³ Ryan Clarke and Lam Peng Er, "Coronavirus Research in China: Origins, International Networks, and Consequences," Non-Traditional Security (NTS)-Asia Consortium, Nanyang Technological University Singapore, 20 May 2021, p. 12, 17-18.

¹¹⁷⁴ The quoted text is "采集高致病性病原微生物样本的工作人员在采集过程中应当防止病原微生物扩散和感染, 并对样本的来源, 采集过程和方法等作详细记录." See the Ministry of Agriculture and Rural Affairs (2020 No. 15), Ministry of Education, Ministry of Science and Technology, the National Health Commission, the General Administration of Customs, the National Forestry and Grasslands Administration, and the Chinese Academy of Sciences, "Circular on Strengthening Biosecurity and Biosafety Management of Animal Pathogen Molecular Biology

Labs” (关于加强动物病原微生物实验室生物安全管理的通知), *Chinese Academy of Sciences* (Online), issued on 09 February 2020, posted online on 02 March 2020

¹¹⁷⁵ Ibid. The quoted text is “各实验室及其设立单位应加强相关实验活动废弃物的处置监管, 保证灭菌有效, 流向可追溯.”

¹¹⁷⁶ See, “Announcement of Deal Reached for Project to Renovate the Hazardous Waste Management System at the Zhengdian Campus of the Chinese Academy of Sciences Wuhan Institute of Virology” (中国科学院武汉病毒研究所郑店园区危废处理系统改造工程成交公告), *Chinese Government Procurement Network* (中国政府采购网), 31 July 2019. Thanks to the DRASTIC Research Group for locating this document and archiving it.
<https://archive.ph/3CW03#selection-149.0-152.0>

¹¹⁷⁷ The quoted text is “配合做好新建, 改建, 扩建生物安全三级, 四级实验室审查. 建立和完善部门间生物安全三级, 四级实验室管理信息交流机制, 共同推动实验室依法依规建设.” See the Ministry of Agriculture and Rural Affairs (2020 No. 15), Ministry of Education, Ministry of Science and Technology, the National Health Commission, the General Administration of Customs, the National Forestry and Grasslands Administration, and the Chinese Academy of Sciences, “Circular on Strengthening Biosecurity and Biosafety Management of Animal Pathogen Molecular Biology Labs” (关于加强动物病原微生物实验室生物安全管理的通知), *Chinese Academy of Sciences* (Online), issued on 09 February 2020, posted online on 02 March 2020.

¹¹⁷⁸ See, “Xiang Shuilun Examines the Wuhan Institute of Virology’s Work of Establishing a ‘Red Flag Party Branch’” (项水伦考核武汉病毒所“红旗党支部”创建工作), *Wuhan Institute of Virology* (Online), 11 June 2019; “Keep Firmly in Mind Your Responsibilities, Hold Fast to the Mission, Be a Pioneer for our Nation in the Realm of High-Level Biosafety – The Achievements of the Zhengdian Lab Party Branch of the Chinese Academy of Sciences Wuhan Institute of Virology (牢记责任, 坚守使命 做我国高等级生物安全领域的开拓者—中科院武汉病毒所郑店实验室党支部事迹), *Wuhan Institute of Virology* (Online), 12 November 2019.

¹¹⁷⁹ Lily Kuo, “China Fires Two Senior Hubei Officials Over Coronavirus Outbreak,” *The Guardian*, 11 February 2020.

¹¹⁸⁰ “China Removes Party Chiefs in Hubei and Wuhan Amid Epidemic,” *Reuters* reprinted in *Nikkei Asia*, 13 February 2020; Kalpit A. Mankar, “Proximity to China’s Chief a Double-Edged Sword,” *Observer Research Foundation* (Online), 24 October 2020.

¹¹⁸¹ Jasper Becker, *Made in China: Wuhan, Covid, and the Quest for Biotech Supremacy*, (London: C. Hurst & Co. Ltd., 2021), p. 219.

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¹¹⁸⁷ Nick Wadhams and Jennifer Jacobs, “China Concealed Coronavirus Outbreak Extent: U.S. Intelligence Says,” *Bloomberg*, 01 April 2020.

¹¹⁸⁸ Harry Cole and Stephen Adams, “China’s Efforts to Blame Coronavirus on a US Army Delegation to Wuhan Infuriate No. 10 as Boris Johnson’s Advisers Say Beijing’s Statistics on its Cases Could be Downplayed by a Factor of 40,” *The Mail on Sunday*, 28 March 2020.

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¹¹⁹⁰ Tim K. Tsang, et. al., “Effect of Changing Case Definitions for COVID-19 on the Epidemic Curve and Transmission Parameters in Mainland China: a Modelling Study,” *The Lancet Public Health*, Volume 5, Issue 5, E289-E296, 01 MAY 2020, published online 21 April 2020.

¹¹⁹¹ John Xie, “In China, Officials Exclude Asymptomatic COVID-19 Carriers From Data,” *Voice of America*, 28 March 2020.

¹¹⁹² Amy Woodyatt, Ivana Kottasová, James Griffiths, and Helen Regan, “China’s Changed How it Counts Virus Cases Three Times Now. Here’s Why,” *CNN*, 12 February 2020.

¹¹⁹³ George Calhoun, "Part 1: Beijing Is Intentionally Underreporting China's Covid Death Rate," *Forbes Magazine*, 02 January 2022. George Calhoun, "China's Manipulation Of Covid Data: The Two 'Smoking Guns'," *Forbes Magazine*, 17 January 2022.

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¹²¹⁸ The exact statement at that time was “Up until now, the investigation has not yet uncovered obvious transmission from person-to-person nor infections of medical personnel.” See, “Wuhan Municipal Health Commission Situational Report on a Pneumonia Epidemic Currently in our City” (武汉市卫健委关于当前我市肺炎疫情的情况通报), *Wuhan Municipal Health Commission* (Online), 31 December 2019.

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¹²²² Ibid. Emphasis added. The quoted text is “既要立足当前, 科学精准打赢疫情防控阻击战, 更要放眼长远, 总结经验, 吸取教训, 针对这次疫情暴露出来的短板和不足, 抓紧补短板, 堵漏洞, 强弱项, 该坚持的坚持, 该完善的完善, 该建立的建立, 该落实的落实, 完善重大疫情防控体制机制, 健全国家公共卫生应急管理体系。”

¹²²³ Ibid. The quoted text is “习近平强调, 要强化公共卫生法治保障, 全面加强和完善公共卫生领域相关法律法规建设, 认真评估传染病防治法, 野生动物保护法等法律法规的修改完善。”

¹²²⁴ Ibid. Emphasis added. The quoted text is “要从保护人民健康, 保障国家安全, 维护国家长治久安的高度, 把生物安全纳入国家安全体系, 系统规划国家生物安全风险防控和治理体系建设, 全面提高国家生物安全治理能力. 要尽快推动出台生物安全法, 加快构建国家生物安全法律法规体系, 制度保障体系。”

¹²²⁵ Don Tse and Larry Ong, “Coronavirus Pushes CCP Factional Struggle to Inflection Point,” *SinoInsider*, April 2020, pg. 8-9.

¹²²⁶ Ibid, pg. 7.

¹²²⁷ Ibid, pg. 6-9.

¹²²⁸ The quoted text is “要优化重要应急物资产能保障和区域布局, 做到关键时刻调得出, 用得上。” “Xi Jinping Chairs and Convenes the 12th Meeting of the Central Commission on Comprehensively Deepening Reform and Emphasizes: Improve the System and Mechanisms for Major Epidemic Prevention and Control and Strengthen the National Public Health Emergency Management System” (习近平主持召开中央全面深化改革委员会第十二次会议强调：完善重大疫情防控体制机制 健全国家公共卫生应急管理体系), *Xinhua News Agency* re-posted on the *Central Government of the People’s Republic of China* (Online), 14 February 2020.

¹²²⁹ Ibid. The quoted text is “对短期可能出现的物资供应短缺, 建立集中生产调度机制, 统一组织原材料供应, 安排定点生产, 规范质量标准, 确保应急物资保障有序有力. 要健全国家储备体系, 科学调整储备的品类, 规模, 结构, 提升储备效能. 要建立国家统一的应急物资采购供应体系, 对应急救援物资实行集中管理, 统一调拨, 统一配送, 推动应急物资供应保障网更加高效安全可控。”

¹²³⁰ Ibid. The quoted text is “习近平指出, 要改革完善疾病预防控制体系, 坚决贯彻预防为主的健康工作方针, 坚持常备不懈, 将预防关口前移, 避免小病酿成大疫。”

¹²³¹ Ibid. The quoted text is “要强化风险意识, 完善公共卫生重大风险研判, 评估, 决策, 防控协同机制。”

¹²³² Ibid. The quoted text is “要鼓励运用大数据, 人工智能, 云计算等数字技术, 在疫情监测分析, 病毒溯源, 防控救治, 资源调配等方面更好发挥支撑作用。”

¹²³³ “Full Transcript of News Conference on February 15, 2020,” (2020 年 2 月 15 日新闻发布会文字实录), *National Health Commission of the People’s Republic of China* (Online), 15 February 2020.

¹²³⁴ The Chinese title is “关于加强新冠病毒高等级病毒微生物实验室生物安全管理的指导意见.” For an example of an official source where the existence of this directive was cited, see “Written Transcript of News Conference on February 15, 2020,” (2020 年 2 月 15 日新闻发布会文字实录), the *PRC National Health Commission* (Online), 15 February 2020.

¹²³⁵ “Xi Jinping Demands that Biosecurity Legislation be Expedited, China Ministry of Science and Technology Rushes to Release Management Regulations,” (习近平要求加速生物安全立法 中国科学技术部急推管理法规), *Radio Free Asia*, 15 February 2020. Xi Jinping (习近平), “Xi Jinping: Remarks to the Central Committee’s Politburo

Standing Committee Meeting on Responding to the Novel Coronavirus Pneumonia Epidemic,” (习近平：在中央政治局常委会会议研究应对新型冠状病毒肺炎疫情工作时的讲话), Seeking Truth (求是), 15 February 2020.

¹²³⁶ The relevant text that makes this link is “为合法合规, 高效有序地推进全国应急科技攻关, 先后印发《关于加强新冠肺炎科技攻关相关管理的通知》《关于加强新冠病毒高等级病毒微生物实验室生物安全管理的指导意见》, 为打赢疫情防控科技攻坚战提供有力的制度保障. 积极配合全国人大, 司法部等有关部门开展《生物安全法》《动物防疫法》《生物技术研究开发安全管理条例》等法律法规起草工作, 提出相关立法建议, 推动构建我国生物安全风险防控的长效机制.” See, “Ministry of Science and Technology Situational Report on the Construction of a Rule by Law Government in 2020” (科技部 2020 年法治政府建设情况报告), the *PRC Ministry of Science and Technology* (Online), 30 March 2021.

¹²³⁷ Ibid. The quoted text is “推动构建我国生物安全风险防控的长效机制.”

¹²³⁸ Emphasis added. The quoted text is “根据科技部下发的《关于加强新冠病毒高等级病毒微生物实验室生物安全管理的指导意见》, 全面加强生物安全教育, 安全隐患排除, 组织广大职工认真学习‘生物安全管理’相关制度, 进一步提醒科研人员做好自身的科研防护, 确保科研工作有序开展, 做到安全防范.” See, “Provincial Academy of Sciences: Institute of Microbiology Focuses on Epidemic Prevention and Control by Actively Carrying Out Scientific Research to Tackle the Key Problem of the Epidemic” (省科学院: 微生物所围绕防控疫情积极开展科研攻关), *Heilongjiang Provincial CCP Committee Party Building* (Online), 26 February 2020.

¹²³⁹ His name was Wu Yuanbin (吴远彬), and his title was the director of the Bureau for Social Development Science and Technology (科技部社会发展科技司司长).

¹²⁴⁰ Emphasis added. The quoted text is “出台《关于加强新冠病毒高等级病毒微生物实验室生物安全管理的指导意见》, 要求实验室发挥平台作用, 服务科技攻关需求, 各主管部门要加强对实验室, 特别是对病毒的管理, 确保生物安全. 在科技攻关中既强调特事特办, 又强调合法合规...” See, “Full Transcript of News Conference on February 15, 2020,” (2020 年 2 月 15 日新闻发布会文字实录), *National Health Commission of the People’s Republic of China* (Online), 15 February 2020.

¹²⁴¹ Ibid.

¹²⁴² Ibid. The quoted text is “目前我们已经设计完成了这个疫苗, 现在已经在动物体内进行测试, 看看免疫效果, 还要进行安全性评价. 现在正在做的工作还有生产工艺研发的过程.”

¹²⁴³ Botao Xiao and Lei Xiao, “The Possible Origins of 2019-nCoV Coronavirus,” *Research Gate*, Preprint, 15 February 2020. Alina Chan and Matt Ridley, *Viral: The Search for the Origin of COVID-19*, (Harper Collins Publishers: New York, November 2021), pg. 60.

¹²⁴⁴ Ibid.

¹²⁴⁵ Sharri Markson, *What Really Happened in Wuhan*, Sydney, Australia: HarperCollins Publishers, September 2021, pg. 363-364. Note that Senator Rubio’s staff has independently reviewed a screenshot of the Weibo post in question. Its authenticity is difficult to judge.

¹²⁴⁶ The case of Li Ning, a well-known scientist at the Chinese Academy of Engineering and China Agricultural University, is one recent example. See Markson, pg. 366-367; and Li Yan, “Biosafety Guideline Issued to Fix Chronic Management Loopholes at Virus Labs,” *The Global Times*, 17 February 2020.

¹²⁴⁷ Huang’s name in Chinese is written as 黄燕玲. Don Tse and Larry Ong, “Coronavirus Pushes CCP Factional Struggle to Inflection Point,” *SinoInsider*, April 2020, pg. 16; Sharri Markson, *What Really Happened in Wuhan*, (Sydney, Australia: HarperCollins Publishers, September 2021), pg. 359-361.

¹²⁴⁸ Don Tse and Larry Ong, “Coronavirus Pushes CCP Factional Struggle to Inflection Point,” *SinoInsider*, April 2020, pg. 16-17.

¹²⁴⁹ “Wuhan Institute of Virology Responds to ‘Patient Zero’: Huang Yanling Has Not Been Infected,” (武汉病毒所回应“零号病人”: 黄燕玲未曾被感染), *Xinhua News Agency*, 16 February 2020.

¹²⁵⁰ Sharri Markson, *What Really Happened in Wuhan*, Sydney, Australia: HarperCollins Publishers, September 2021, pg. 360.

¹²⁵¹ Tse and Ong, pg. 16-17.

¹²⁵² Markson interviews China expert Miles Yu who makes this point (pg. 361-362). For other examples unrelated to the coronavirus outbreak, see Katie Hunt, “China: Detained Swedish Man Makes TV Confession,” *CNN*, 20 January 2016; Steven Lee Myers, “How China Uses Forced Confessions as a Propaganda Tool,” *The New York Times*, 11 April

2018; and Dominique Patton and Natalie Thomas, “Chinese Tennis Player Peng Denies Making Accusation of Sexual Assault,” *Reuters*, 07 February 2022.

¹²⁵³ William Zheng, “Why Chinese President Xi Jinping Called 170,000 Cadres About the Coronavirus Epidemic,” *South China Morning Post*, 25 February 2020.

¹²⁵⁴ “Why Xi Spoke Directly to 170,000 Cadres; How Globalization Affects China,” *SinoInsider*, 27 February 2020.

¹²⁵⁵ The quoted/referenced text is “1月22日,党中央果断要求湖北省对人员外流实施全面严格管控。作出这一决策,需要巨大政治勇气,但该出手时必须出手,否则当断不断,反受其乱。” See, “Xi Jinping: Speech at the Conference on Planning and Promoting Prevention and Control for the Novel Coronavirus Pneumonia Epidemic and Social-Economic Development Work Deployment” (习近平:在统筹推进新冠肺炎疫情防控和经济社会发展工作部署会议上的讲话), *Xinhua News Agency* re-posted on the *Central Government of the People’s Republic of China* (Online), 24 February 2020.

¹²⁵⁶ *Ibid.* The quoted text is “实践证明,党中央对疫情形势的判断是准确的,各项工作部署是及时的,采取的举措是有力有效的。防控工作取得的成效,再次彰显了中国共产党领导和中国特色社会主义制度的显著优势。”

¹²⁵⁷ *Ibid.* The quoted text is “在这次应对疫情中,暴露出我国在重大疫情防控体制机制,公共卫生应急管理体系等方面存在的明显短板,要总结经验,吸取教训...抓紧补短板,堵漏洞,强弱项,提高应对突发重大公共卫生事件的能力和水平...真正把问题解决在萌芽之时,成灾之前。”

¹²⁵⁸ *Ibid.* The quoted text is “四是加强医用物资和生活必需品应急保供。打疫情防控阻击战,实际上也是打后勤保障战。我们采取积极措施,支持医用防护服,口罩等疫情防控急需医疗物资的生产企业迅速复工复产...”

¹²⁵⁹ *Ibid.* The quoted text is “作为一种新发传染病,我们对新冠肺炎的认识还比较初步。要综合多学科力量开展科研攻关,加强传染源,传播致病机理等理论研究...要加大药品和疫苗研发力度。”

¹²⁶⁰ *Ibid.* The quoted text is “我们推动做好社会面安全稳定工作,妥善处理疫情防控中可能出现的各类问题,维护医疗秩序,市场秩序等,严厉打击涉疫违法犯罪,加强群众心理疏导和干预。”

¹²⁶¹ *Ibid.* Emphasis added. The quoted text is “我们加大宣传舆论工作力度,统筹网上网下,国内国际,大事小事,营造强信心,暖人心,聚民心的环境氛围。我们规范和完善信息发布机制,深入宣传党中央决策部署,充分报道各地区各部门联防联控的措施成效,生动讲述防疫抗疫一线的感人事迹。我们广泛普及疫情防控知识,引导人民群众正确理性看待疫情...我们及时回应社会关切特别是群众的集中诉求,不回避矛盾,积极推动问题解决。我们改进和加强对外宣传,运用多种形式在国际舆论场及时发声,讲好中国抗疫故事,及时揭露一些别有用心的人污蔑抹黑,造谣生事的言行...”

¹²⁶² Zhou Yusen (周育森), Zhao Guangyu (赵光宇), Gu Hongjing (谷宏婧), Sun Shihui (孙世惠), He Lei (何雷), Li Yan (黎燕), Han Gengcheng (韩根成), Lang Xiaolin (朗小玲), Liu Jie (刘杰), Geng Shusheng (耿树生), and Sheng Xiaoli (盛晓丽), “Novel Coronavirus COVID-19 Vaccine, Methods of Preparation and its Applications,” (新型冠状病毒 COVID-19 疫苗,制备方法及其应用), *National Intellectual Property Administration of China* (Online), application date 24 February 2020, patent authorization date 26 June 2020, Patent Authorization Number: CN 111333704 A. Please note that Senator Rubio’s staff has independently reviewed the original Chinese patent application filed by Zhou and his team, but for the purposes of the general reader who may not be able to access or read the original Chinese document, you may consult Sharri Markson, *What Really Happened in Wuhan*, Sydney, Australia: HarperCollins Publishers, September 2021, pg. 370.

¹²⁶³ The Chinese name of the firm is 北京昭衍生物技术有限公司. It is a pharmaceutical contract development and manufacturing organization that was founded in early 2018, according to its website. See, <http://www.joinnbio.com.cn>

¹²⁶⁴ The full description is a Ministry of Science and Technology “emergency project to tackle the key problem [the coronavirus outbreak]” (国家科技部的应急攻关项目), which is taken from an updated press release from early 2020 on the website of JOINN Biologics. See, “JOINN Biologics Assists Research and Development of Novel Coronavirus Recombinant Protein Vaccine” (昭衍生物助力新型冠状病毒重组蛋白疫苗研发), <http://m.joinnbio.com.cn/news/22.html>

¹²⁶⁵ Fang Li, et. al., “Molecular Mechanism for Antibody-Dependent Enhancement of Coronavirus Entry,” *Journal of Virology*, 2020 March; 94(5): e02015-19, published online 14 February 2020, submitted on 27 November 2019.

¹²⁶⁶ *Ibid.*

¹²⁶⁷ The quoted text is “我们单位是科学院团队, 我们承担的工作是重组的蛋白疫苗. 重组蛋白疫苗是把一个病原体最有效的抗原成份基因拿出来, 进行体外重组, 表达蛋白, 然后制成疫苗. 这种疫苗不需要场所, 比如病毒特征的灭活苗需要一个相应生物安全等级的场所. 目前这个疫苗进展非常顺利, 我们团队这两年做 MERS 疫苗, 在疫苗设计过程中我们取得了一些好的结果. 新冠病毒来了以后, 我们很快把这个策略和方法用在新冠病毒疫苗的设计, 目前我们已经设计完成了这个疫苗, 现在已经在动物体内进行测试, 看看免疫效果, 还要进行安全性评价. 现在正在做的工作还有生产工艺研发的过程.” See, “Full Transcript of News Conference on February 15, 2020,” (2020 年 2 月 15 日新闻发布会文字实录), *National Health Commission of the People’s Republic of China* (Online), 15 February 2020.

¹²⁶⁸ See, “JOINN Biologics Assists Research and Development of Novel Coronavirus Recombinant Protein Vaccine” (昭衍生物助力新型冠状病毒重组蛋白疫苗研发), <http://m.joinnbio.com.cn/news/22.html>

¹²⁶⁹ For an in-depth discussion of such continuities, see Yan’s paper with George Gao that was published in June 2020 on the SARS-CoV-2 vaccines that they had developed. George F. Gao, et. al., “A Universal Design of Betacoronavirus Vaccines against COVID-19, MERS, and SARS,” *Cell Journal*, 2020 Aug 6;182(3):722-733.e11, published online on 28 June 2020 and in print form on 06 August 2020.

¹²⁷⁰ Both Yan Jinghua and Zhang Xinmin (张新民), the director of the Biology Center at the Ministry of Science and Technology, stated at the press conference on February 15 that multiple lines of vaccine development were underway, including inactivated viral vaccines (灭活疫苗), mRNA vaccines, recombinant protein vaccines (重组蛋白疫苗), viral vector vaccines (病毒载体疫苗), and DNA vaccines. See, “Full Transcript of News Conference on February 15, 2020,” (2020 年 2 月 15 日新闻发布会文字实录), *National Health Commission of the People’s Republic of China* (Online), 15 February 2020.

¹²⁷¹ The three researchers at the PLA AMMS Institute of Microbiology and Epidemiology who were both coauthors of the November 2019 MERS paper and listed as co-inventors on the vaccine patent were Zhou Yusen (周育森), Sun Shihui (孙世惠), and He Lei (何雷). See, Fang Li, Et. al., “Molecular Mechanism for Antibody-Dependent Enhancement of Coronavirus Entry,” *Journal of Virology*, Volume 94, Issue 5, March 2020.

¹²⁷² See Yan’s faculty profile on the website of the Chinese Academy of Sciences University.
<https://peopleucas.ac.cn/~jhyan>

¹²⁷³ Dake Kang, Maria Cheng, and Sam McNeil, “China Clamps Down in Hidden Hunt for Coronavirus Origins,” *The Associated Press*, 30 December 2020. The first CDCP directive was called “Notice of the Institute of Viral Disease Prevention and Control on Strengthening Management of Science and Technological Achievements During the Prevention and Control Period of the Novel Coronavirus Pneumonia Epidemic” (病毒病预防控制所关于加强新型冠状病毒肺炎疫情防控期间有关科技成果管理的通知). Thanks to the Associated Press, it can be accessed here: <https://www.documentcloud.org/documents/7340335-China-CDC-Sci-Tech.html>

¹²⁷⁴ Dake Kang, Maria Cheng, and Sam McNeil, “China Clamps Down in Hidden Hunt for Coronavirus Origins,” *The Associated Press*, 30 December 2020. The second CDCP directive was called “On the Supplementary Regulations on Strengthening the Management of Science and Technology During the Emergency Response to the Novel Coronavirus Pneumonia” (关于加强新型冠状病毒肺炎应急响应期间有关科技管理的补充规定). Thanks to the Associated Press, it can be accessed here: <https://www.documentcloud.org/documents/7340336-China-CDC-Sup-Regs.html>

¹²⁷⁵ Ibid, p. 6.

¹²⁷⁶ Ibid, p. 6.

¹²⁷⁷ “Zhao Kezhi’s Speech at the Deployment Meeting for the Overall Planning and Promotion of the National Public Security Units’ Work to Prevent and Control the Novel Coronavirus Pneumonia Epidemic and Safeguard Political Security and Social Stability Emphasized Earnestly Studying and Implementing the Spirit of General Secretary Xi Jinping’s Important Speeches and Diligently Planning for and Promoting Epidemic Prevention and Control and Economic and Social Development to Create a Safe and Stable Environment” (赵克志在统筹推进全国公安机关新冠肺炎疫情防控和维国家政治安全社会稳定工作部署会议上强调认真学习贯彻习近平总书记重要讲话精神, 努力为统筹推进疫情防控和经济社会发展创造安全稳定环境), the *PRC Ministry of Public Security* (Online), 24 February 2020. On February 25, the *Legal Daily* also printed the story under the headline: “赵克志: 努力为统筹推进疫情防控和经济社会发展创造安全稳定环境.”

¹²⁷⁸ Ibid. The quoted text is “赵克志要求, 要始终把维护政治安全放在首位, 严密防范, 坚决打击境内外敌对势力借疫情进行的各种捣乱破坏活动, 及时发现处置各类网上谣言和有害信息, 坚决捍卫国家政治安全。”

¹²⁷⁹ “China's Legislature Adopts Decision on Banning Illegal Trade, Consumption of Wildlife,” *Xinhua* reprinted on the *State Council of the People's Republic of China* (Online), 25 February 2020.

¹²⁸⁰ Ibid.

¹²⁸¹ Smriti Mallapaty, “China Set to Clamp Down Permanently on Wildlife Trade in Wake of Coronavirus,” *Nature Magazine*, 21 February 2020.

¹²⁸² Ben Westcott, “China Coronavirus: Eating Wild Animals Made Illegal But Ending the Trade Won't be Easy,” *CNN*, 05 March 2020.

¹²⁸³ Julia Hollingsworth and Yong Xiong, “China's Truth-tellers: China Created a Story of the Pandemic. These People Revealed Details Beijing Left Out,” *CNN*, 15 February 2021.

¹²⁸⁴ Lily Kuo, “‘They're Chasing Me’: the Journalist who Wouldn't Stay Quiet on Covid-19,” *The Guardian*, 01 March 2020; Alexis Carey, “Mystery of missing activists who spoke out about China's Covid cover-up,” *News.Com.Au*, 05 October 2021.

¹²⁸⁵ “Li Zehua: Journalist who 'Disappeared' after Wuhan Chase Reappears,” *BBC News*, 23 April 2020.

¹²⁸⁶ Keith Zhai, “Chinese Citizen Journalist Who Documented Covid-19 in Wuhan Resurfaces After 600 Days,” *Wall Street Journal*, 01 October 2021.

¹²⁸⁷ Liu Jie, Wang Pan and Xiao Sisi, “Profile: Zhong Nanshan: outspoken doctor awarded China's top honor,” *XinhuaNet*, 08 September 2020.

¹²⁸⁸ Javier C. Hernandez and Austin Ramzy, “China Confirms New Coronavirus Spreads From Humans to Humans,” *The New York Times*, 20 January 2020.

¹²⁸⁹ “China Focus: Confident Novel Coronavirus Outbreak under Control by Late April: Health Expert,” *XinhuaNet*, 27 February 2020.

¹²⁹⁰ “Xi Jinping During Inspections in Beijing of Research and Development Work to Tackle the Key Problem of the Novel Coronavirus Pneumonia Prevention and Control Work Emphasizing Making a Coordinated Push, Research and Development Work to Tackle the Key Problem of the Novel Coronavirus Pneumonia Prevention and Control Work Provides Powerful Science and Technology Support to Win the Blockade War of Epidemic Prevention and Control” (习近平在北京考察新冠肺炎防控科研攻关工作时强调 协同推进, 新冠肺炎防控科研攻关 为打赢疫情防控阻击战提供科技支撑), *Xinhua News Agency*, 03 March 2020.

¹²⁹¹ Xi Jinping, “Provide Powerful Science and Technology Support to Win the Blockade War of Epidemic Prevention and Control” (为打赢疫情防控阻击战提供强大科技支撑), *Seeking Truth* (求是), 15 March 2020.

¹²⁹² Ibid. Emphasis added. The quoted text is “统筹病毒溯源及其传播途径研究, 搞清楚病源从哪里来, 向哪里去。正如专家所言, 这次疫情病毒很狡猾, 溯源工作面临很大困难。同时, 新技术发展为病毒溯源提供了新的手段, 可以利用病毒蛋白和不同受体的结合特征, 评估可疑动物作为中间宿主的可能性, 利用人工智能, 大数据等新技术开展流行病学和溯源调查, 提高精准度和筛查效率。病毒溯源和传播途径研究, 对整个疫情防控至关重要, 必须全力弄清楚。”

¹²⁹³ Ibid. The quoted text is “重大传染病和生物安全风险是事关国家安全和发展的, 事关社会大局稳定的重大风险挑战。要把生物安全作为国家总体安全的重要组成部分, 坚持平时和战时结合, 预防和应急结合, 科研和救治防控结合...”

¹²⁹⁴ Ibid. The quoted text is “完善疫情防控预警预测机制, 及时有效捕获信息, 及时采取应对举措。”

¹²⁹⁵ Ibid. The quoted text is “要完善关键核心技术攻关的新型举国体制, 加快推进人口健康, 生物安全等领域科研力量布局, 整合生命科学, 生物技术, 医药卫生, 医疗设备等领域的国家重点科研体系... 加强生命科学领域的基础研究和医疗健康关键核心技术突破... 要加快补齐我国高端医疗装备短板, 加快关键核心技术攻关, 突破这些技术装备瓶颈, 实现高端医疗装备自主可控。”

¹²⁹⁶ The Chinese name of the State Council directive is “关于规范新冠肺炎科研攻关成果信息发布管理的通知。” The Associated Press was the first to obtain and report on it. Dake Kang, Maria Cheng, and Sam McNeil, “China Clamps Down in Hidden Hunt for Coronavirus Origins,” *The Associated Press*, 30 December 2020.

¹²⁹⁷ Ibid.

¹²⁹⁸ Lin Tingyao (林庭瑶) and Ni Huairan (倪懷仁), “Exclusively Obtained Red-Letterhead Document: The Chinese Communist Party Concealed Wuhan Epidemic” (獨家取得紅頭文件: 中共隱瞞武漢疫情), *The Storm Media* (瘋傳媒), 15 April 2020.

¹²⁹⁹ Dake Kang, Maria Cheng, and Sam McNeil, “China Clamps Down in Hidden Hunt for Coronavirus Origins,” *The Associated Press*, 30 December 2020.

¹³⁰⁰ The quoted text is “把新冠肺炎治疗药物, 疫苗, 病毒溯源, 病毒传播途径, 检测试剂等各类疫情防控科研成果信息的发布工作, 纳入国务院应对新型冠状病毒肺炎疫情联防联控机制科研攻关组 (以下简称科研攻关组) 的统一部署. 科研攻关组统筹协调科研应急攻关成果信息发布, 指导, 协调各地各单位科研成果信息发布.” See, Joint Prevention and Control Mechanism of the State Council’s Scientific Research Group for the Offensive Campaign Against the Novel Coronavirus Pneumonia Epidemic (国务院应对新型冠状病毒肺炎疫情联防联控机制科研攻关组), “Notice on the Standardization of the Management of the Release of Findings and Information from the Scientific Research Offensive Campaign Against the Novel Coronavirus Pneumonia” (关于规范新冠肺炎科研攻关成果信息发布管理的通知), released on 03 March 2020, published online by *The Associated Press* on 30 December 2020. Please note that our English translation differs somewhat from that posted by AP as it took a more literal approach.

¹³⁰¹ Ibid. The quoted text is “各高等院校, 研究机构, 医疗机构, 企业及其人员在疫情防控期间, 未经审批不得擅自发布疫情防控相关科研成果信息.”

¹³⁰² Ibid. The quoted text is “原则上, 新冠肺炎科研成果信息首发采用官方权威发布形式. 舆论转班加强与宣传组沟通, 结合舆情动态和社会关切, 强化对科研成果信息发布的指导.”

¹³⁰³ Ibid. The quoted text is “对未按规定程序报批, 发布未经证实的虚假科研成果信息, 造成严重不良社会影响的, 要追究责任.” It is worth noting that the final phrase “will be held accountable” (要追究责任) is usually expressed as “will be held accountable in accordance with the law” (依法追究责任人). The omission of that qualifier (依法) intensifies the ominous tone of its warning to its recipients.

¹³⁰⁴ Gordon Watts, “China’s X-Files and the Virus Blame Game,” *Asia Times*, 09 March 2020.

¹³⁰⁵ Ben Westcott and Steven Jiang, “Chinese Diplomat Promotes Conspiracy Theory that US Military Brought Coronavirus to Wuhan,” *CNN*, 13 March 2020.

¹³⁰⁶ Don Tse and Larry Ong, “Coronavirus Pushes CCP Factional Struggle to Inflection Point,” *SinoInsider*, April 2020, pg. 34; Stephen McDonnell, “Ren Zhiqiang: Outspoken Ex-Real Estate Tycoon Gets 18 Years Jail,” *BBC News*, 22 September 2020.

¹³⁰⁷ Tse and Ong, pg. 34.

¹³⁰⁸ “China Internet: Ren Zhiqiang’s Account Blocked After Xi Criticism,” *BBC News*, 28 February 2016.

¹³⁰⁹ Jun Mai, “‘It’s All Fake!’ Angry Residents Shout at Chinese Vice-Premier in Coronavirus-Hit Wuhan,” *South China Morning Post*, 06 March 2020; “Residents Shout from Above ‘It’s All Fake’ as Sun Chunlan Inspects Residential Building, Beijing Source Says Xi to Visit Wuhan, Predicts First Stop at Jinyintan” (孫春蘭視察住戶樓上喊造假, 京消息人士: 習擬訪武漢, 料先赴金銀潭), *Ming Pao* (明報), 06 March 2020.

¹³¹⁰ Lily Kuo, “‘Fake, Fake’: Senior Chinese Leader Heckled by Residents on Visit to Coronavirus City,” *The Guardian*, 06 March 2020.

¹³¹¹ Don Tse and Larry Ong, “Coronavirus Pushes CCP Factional Struggle to Inflection Point,” *SinoInsider*, April 2020, pg. 19.

¹³¹² Ibid.

¹³¹³ Gary R. Whittaker, “SARS-CoV-2 Spike and its Adaptable Furin Cleavage Site,” *The Lancet*, Volume 2, Issue 10, e488-e489, 01 October 2021, published online on 06 August 2021; Wei Li, “Delving Deep into the Structural Aspects of a Furin Cleavage Site Inserted into the Spike Protein of SARS-CoV-2: A Structural Biophysical Perspective,” *Journal of Biophysical Chemistry*, 2020 September, 264:106420, published online 29 June 2020.

¹³¹⁴ “Xi Jinping Inspects Novel Coronavirus Pneumonia Epidemic Control and Prevention Work in Hubei Province” (习近平在湖北省考察新冠肺炎疫情防控工作), *Xinhua News Agency*, 10 March 2020; “Xi Jinping Visits Wuhan: Epidemic Control Achieves Important Interim Results” (習近平訪武漢: 疫情防控取得階段性重要成果), *Ming Pao*, 10 March 2020.

¹³¹⁵ Steven Lee Myers, “Xi Goes to Wuhan, Coronavirus Epicenter, in Show of Confidence,” *The New York Times*, 10 March 2020.

¹³¹⁶ The relevant text is “北京消息人士對本報稱，習近平擬於近期前往湖北武漢視察新冠疫情防控工作。” See, “Residents Shout from Above ‘It’s All Fake’ as Sun Chunlan Inspects Residential Building, Beijing Source Says Xi to Visit Wuhan, Predicts First Stop at Jinyintan” (孫春蘭視察住戶樓上喊造假, 京消息人士：習擬訪武漢, 料先赴金銀潭), *Ming Pao*, 06 March 2020. Another piece in *Ming Pao* four days later mentioned the earlier report about Xi going to the WIV. “Xi Jinping Visits Wuhan: Epidemic Control Achieves Important Interim Results” (習近平訪武漢：疫情防控取得階段性重要成果), *Ming Pao*, 10 March 2020.

¹³¹⁷ “President Xi Declares 7th Military World Games Open,” *Xinhua*, 19 October 2019.

¹³¹⁸ Conversation with Wei Jingsheng and Senator Rubio’s staff, December 16, 2021.

¹³¹⁹ Lily Kuo, “Coronavirus: Wuhan Doctor Speaks Out Against Authorities,” *The Guardian*, 11 March 2020; Josh Rudolph, “Netizen Creativity Preserves Censored Interview with Wuhan Doctor,” *China Digital Times*, 11 March 2020.

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¹³²¹ Josh Rudolph, “Netizen Creativity Preserves Censored Interview with Wuhan Doctor,” *China Digital Times*, 11 March 2020.

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¹³²⁴ Don Tse and Larry Ong, “Coronavirus Pushes CCP Factional Struggle to Inflection Point,” *SinoInsider*, April 2020, pg. 18.

¹³²⁵ Ibid. The original photo can be seen in the following report: PRC Department of Veteran Affairs, “Bombshell! The Military Successfully Develops Recombinant Vaccine for New Coronavirus” (重磅！军队成功研制重组新冠疫苗), *Fujian Provincial Department of Veteran Affairs* (Online), 18 March 2020.

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¹³³⁶ “Competitive Bid on Chinese Academy of Sciences Wuhan Institute of Virology Central Air Conditioning Renovation Project” (中国科学院武汉病毒研究所中央空调改造工程竞争性磋商), *Chinese Government Procurement Network* (中国政府采购网), 16 September 2019. Thanks to the DRASTIC Research Group for locating this document and archiving it. <https://archive.ph/bfoTD>

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¹³⁵⁵ Ibid. The quoted text is "为实现个人政治目的, 不择手段, 操弄权术, 在党内大搞团团伙伙, 拉帮结派, 培植个人势力, 形成利益集团, 成伙作势控制要害部门, 严重破坏党的团结统一, 严重危害政治安全."

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¹³⁶⁴ Ibid.

¹³⁶⁵ Ibid.

¹³⁶⁶ Hongjing Gu, et. al., “Adaptation of SARS-CoV-2 in BALB/c Mice for Testing Vaccine Efficacy,” *Science*, 369, 1603–1607 (2020), published online on 30 July 2020, published in print on 25 September 2020, originally received on 29 April 2020.

¹³⁶⁷ Yet another of the 32, Jiang Shibo of Fudan University, does not formally work for the PLA, but received his masters and doctoral degrees from the PLA and continues to publish largely with AMMS colleagues.

¹³⁶⁸ They were Zhou Yusen (周育森), Zhao Guangyu (赵光宇), Gu Hongjing (谷宏婧), Sun Shihui (孙世惠), He Lei (何雷), Li Yan (黎燕), Han Gencheng (韩根成), Geng Shusheng (耿树生), and Sheng Xiaoli (盛晓丽). See, Hongjing Gu, et. al., “Adaptation of SARS-CoV-2 in BALB/c Mice for Testing Vaccine Efficacy,” *Science*, 369, 1603–1607 (2020), published online on 30 July 2020, published in print on 25 September 2020, originally received on 29 April 2020; and Zhou Yusen (周育森), Zhao Guangyu (赵光宇), Gu Hongjing (谷宏婧), Sun Shihui (孙世惠), He Lei (何雷), Li Yan (黎燕), Han Gencheng (韩根成), Lang Xiaolin (朗小玲), Liu Jie (刘杰), Geng Shusheng (耿树生), and Sheng Xiaoli (盛晓丽), “Novel Coronavirus COVID-19 Vaccine, Methods of Preparation and its Applications,” (新型冠状病毒 COVID-19 疫苗, 制备方法及其应用), *National Intellectual Property Administration of China* (Online), application date 24 February 2020, patent authorization date 26 June 2020, Patent Authorization Number: CN 111333704 A.

¹³⁶⁹ Nikolai Petrovsky, et. al., “In Silico Comparison of SARS-CoV-2 Spike Protein-ACE2 Binding Affinities Across Species and Implications for Virus Origin,” *Scientific Reports*, 11, Article number: 13063 (2021), published on 24 June 2021, pre-print first published on 13 May 2020.

¹³⁷⁰ Ibid, pg. 3.

¹³⁷¹ Ibid, pg. 7.

¹³⁷² Ibid, pg. 6-7.

¹³⁷³ “China Reports No New Confirmed Coronavirus Cases for the First Time,” *CBS News*, 23 May 2020.

¹³⁷⁴ “Director of Wuhan Institute of Virology Wang Yanyi Responds to Conspiracy Theory About the Source of the Virus” (武汉病毒研究所所长王延轶回应病毒起源阴谋论), *CCTV*, 24 May 2020.

¹³⁷⁵ Ibid. The quoted text is “这次疫情发生以来, 外界一直有一种声音和说法.”

¹³⁷⁶ Ibid. The quoted text is “这种说法完全是无中生有. 武汉病毒所最早是在去年 12 月 30 日第一次接触到, 当时还是叫“不明原因肺炎”的临床样本. 后来经过病原检测, 我们才发现这些样本里面其实含有一种以前完全未知的一个全新的冠状病毒, 也就是现在说的新冠病毒. 在这之前我们是完全没有接触过, 研究过或者保存过这种病毒. 实际上我们也和大家一样, 都不知道这种病毒的存在. 都没有的东西, 怎么去泄漏它呢?”

¹³⁷⁷ The Editorial Board, “We’re still missing the origin story of this pandemic. China is sitting on the answers,” *Washington Post*, 05 February 2021. DRASTIC Research Group, “An Investigation into the WIV Databases that were Taken Offline,” *Research Gate*, February 2021, p. 2-3, 5-6.

¹³⁷⁸ The relevant text is “武汉病毒所的一些研究团队, 比方说石正丽老师的团队, 他们从 2004 年就开始从事蝙蝠 (SARS 样) 冠状病毒的相关研究, 但是他们的研究都是围绕着 SARS 溯源这么一个主题所开展的. 这么多年来, 石老师他们确实分离获得过一些蝙蝠的冠状病毒, 目前一共有三株. 但这三株病毒和 SARS 的相似性最高的有 96%, 但和新冠病毒的相似性最高的都不超过 79.8%.” See, “Director of Wuhan Institute of Virology Wang Yanyi Responds to Conspiracy Theory About the Source of the Virus” (武汉病毒研究所所长王延轶回应病毒起源阴谋论), *CCTV*, 24 May 2020.

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¹³⁸⁰ Eva Dou, “Wuhan Lab’s Classified Work Complicates Search for Pandemic’s Origins,” *The Washington Post*, 22 June 2021. Ryan Clarke and Lam Peng Er, “Coronavirus Research in China: Origins, International Networks, and Consequences,” Non-Traditional Security (NTS)-Asia Consortium, Nanyang Technological University Singapore, 20 May 2021, p. 14.

¹³⁸¹ James T. Aredy, “China Rules Out Animal Market and Lab as Coronavirus Origin,” *The Wall Street Journal*, 26 May 2020; Aristos Georgiou, “Wuhan Seafood Market was a ‘Victim’ of Coronavirus, Says Director of China’s CDC,” *Newsweek*, 27 May 2020.

¹³⁸² Aristos Georgiou, 27 May 2020.

¹³⁸³ Sanjay Gupta, “Autopsy of a Pandemic: 6 Doctors at the Center of the US Covid-19 Response,” *CNN*, 26 March 2021.

¹³⁸⁴ George Fu Gao, et. al., “Surveillance of SARS-CoV-2 in the Environment and Animal Samples of the Huanan Seafood Market,” *Research Square*, pre-print, 25 February 2022, pg. 1-9.

¹³⁸⁵ *Ibid*, pg. 5-6.

¹³⁸⁶ *Ibid*, pg. 2.

¹³⁸⁷ *Ibid*, pg. 8.

¹³⁸⁸ *Ibid*, pg. 3.

¹³⁸⁹ Sharri Markson, *What Really Happened in Wuhan*, Sydney, Australia: HarperCollins Publishers, September 2021, pg. 370.

¹³⁹⁰ Fang Li, et. al., “Molecular Mechanism for Antibody-Dependent Enhancement of Coronavirus Entry,” *Journal of Virology*, 2020 March; 94(5): e02015-19, published online 14 February 2020, submitted on 27 November 2019.

¹³⁹¹ Sharri Markson, *What Really Happened in Wuhan*, Sydney, Australia: HarperCollins Publishers, September 2021, pg. 370.

¹³⁹² *Ibid*, pg. 369-370.

¹³⁹³ See, huixin.D, “Science: Still on the Frontlines of Research and Development Even at the Final Moment of Life! Zhou Yusen and Other Develop Novel Coronavirus Mouse Model” (Science: 生命最后一刻仍奋战在科研一线！周育森等人开发出新冠小鼠模型), *MedSci*, 31 July 2020.

¹³⁹⁴ *Ibid*; and Hongjing Gu, et. al., “Adaptation of SARS-CoV-2 in BALB/c Mice for Testing Vaccine Efficacy,” *Science*, 369, 1603–1607 (2020), published online on 30 July 2020, published in print on 25 September 2020.

¹³⁹⁵ Shihui Sun, Lei He, Zhongpeng Zhao, et al., “Recombinant vaccine containing an RBD-Fc fusion induced protection against SARS-CoV-2 in nonhuman primates and mice,” *Cellular & Molecular Immunology*, 18, 1070–1073 (2021), published online on 17 March 2021, published in print in April 2021.

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¹⁴⁰⁰ *Ibid*. Emphasis added.

¹⁴⁰¹ The Chinese name of the State Council directive is “关于规范新冠肺炎科研攻关成果信息发布管理的通知.” The Associated Press was the first to obtain and report on it. Dake Kang, Maria Cheng, and Sam McNeil, “China Clamps Down in Hidden Hunt for Coronavirus Origins,” *The Associated Press*, 30 December 2020.

¹⁴⁰² Emphasis added. Jesse D. Bloom, “Recovery of Deleted Deep Sequencing Data Sheds More Light on the Early Wuhan SARS-CoV-2 Epidemic,” *Molecular Biology and Evolution*, 09 December 2021; 38(12):5211-5224, pre-print published on 18 June 2021.

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¹⁴⁰⁴ *Ibid*.

¹⁴⁰⁵ Lin Tingyao (林庭瑶) and Ni Huairan (倪懷仁), “Exclusively Obtained Red-Letterhead Document: The Chinese Communist Party Concealed Wuhan Epidemic” (獨家取得紅頭文件: 中共隱瞞武漢疫情), *The Storm Media* (瘋傳媒), 15 April 2020.

¹⁴⁰⁶ Jesse D. Bloom, “Recovery of Deleted Deep Sequencing Data Sheds More Light on the Early Wuhan SARS-CoV-2 Epidemic,” *Molecular Biology and Evolution*, 09 December 2021; 38(12):5211-5224, pre-print published on 18 June 2021.

¹⁴⁰⁷ “Xi Jinping: Build a Strong Public Health System to Provide Powerful Protection for the People's Health” (习近平: 构建起强大的公共卫生体系 为维护人民健康提供有力保障), *Seeking Truth* (求是) reprinted by *Xinhua News Agency*, 15 September 2020.

¹⁴⁰⁸ For discussions of Xi's triumphalism, see Ruairidh Brown, “China: Victory Over Coronavirus will be Heralded as Boost for Xi Jinping's Brand of Marxism,” *The Conversation*, 27 May 2020; and Barbara Demick, “China's Communist Party Declares Victory Over Both the Coronavirus and Critics of the Communist Party at the Biggest Political Event of the Year,” *The New Yorker*, 22 May 2020. For earlier examples of Xi calling it a “people's war,” see Xi Jinping (习近平), “Xi Jinping: Remarks to the Central Committee's Politburo Standing Committee Meeting on Responding to the Novel Coronavirus Pneumonia Epidemic” (习近平: 在中央政治局常委会会议研究应对新型冠状病毒肺炎疫情工作时的讲话) *Seeking Truth* (求是), 15 February 2020; and “Xi Focus: Xi Vows to Win People's War Against Novel Coronavirus,” *Xinhuanet*, 11 February 2020.

¹⁴⁰⁹ The quoted text is “2018 年 1 月, 我在学习贯彻党的十九大精神专题研讨班开班式上列举了 8 个方面 16 个风险, 其中特别讲到 ‘像非典那样的重大传染性疾病, 也要时刻保持警惕, 严密防范.’” See, “Xi Jinping: Build a Strong Public Health System to Provide Powerful Protection for the People's Health” (习近平: 构建起强大的公共卫生体系 为维护人民健康提供有力保障), *Seeking Truth* (求是) reprinted by *Xinhua News Agency*, 15 September 2020.

¹⁴¹⁰ “Xi Jinping Gives Important Speech to Launch Study Session on Implementing the Spirit of the 18th Party Congress” (习近平在学习贯彻党的十九大精神研讨班开班式上发表重要讲话), *Xinhua News Agency* as reposted on the *Central Government of the People's Republic of China* (Online), 05 January 2018.

¹⁴¹¹ The quoted text is “疫情发生后, 我多次提出, 要在做好疫情防控工作的同时, 放眼长远, 总结经验, 吸取教训, 针对疫情防控中暴露出来的问题和不足, 抓紧补短板, 堵漏洞, 强弱项.” See, “Xi Jinping: Build a Strong Public Health System to Provide Powerful Protection for the People's Health” (习近平: 构建起强大的公共卫生体系 为维护人民健康提供有力保障), *Seeking Truth* (求是) reprinted by *Xinhua News Agency*, 15 September 2020.

¹⁴¹² Ibid. Emphasis added. The quoted text is “生命安全和生物安全领域的重大科技成果是国之重器, 一定要掌握在自己手中. 要加大卫生健康领域科技投入, 加快完善平战结合的疫病防控和公共卫生科研攻关体系, 集中力量开展核心技术攻关, 持续加大重大疫病防治经费投入, 加快补齐我国在生命科学, 生物技术, 医药卫生, 医疗设备等领域的短板. 当前, 我们一定要发挥新型举国体制的优势, 力争率先研发成功新冠肺炎疫苗, 争取战略主动. 要深化科研人才发展体制机制改革, 完善战略科学家和创新型科技人才发现, 培养, 激励机制, 吸引更多优秀人才进入科研队伍, 为他们脱颖而出创造条件.”

¹⁴¹³ Ben Westcott and Nectar Gan, “Chinese Academic who Criticized Leader Xi Jinping Allegedly Fired from Top University,” *CNN*, 14 July 2020; Chun Han Wong, “Chinese Law Professor Who Criticized Xi Jinping to Fight Charge and Dismissal,” *The Wall Street Journal*, 29 July 2020.

¹⁴¹⁴ Chun Han Wong, “Chinese Law Professor Who Criticized Xi Jinping to Fight Charge and Dismissal,” *The Wall Street Journal*, 29 July 2020.

¹⁴¹⁵ Echo Xie and Su Xinqi, “Tsinghua University Suspends Xu Zhangrun, Chinese Law Professor who Criticized Xi Jinping,” *The South China Morning Post*, 27 March 2019; and Geremie R. Barmé, “Justified Fears, Diminished Hopes, Unflagging Faith: Revisiting Xu Zhangrun's July 2018 Jeremiad,” *China Heritage*, 08 August 2021. For more on Xu's work, see Matt Seaton, “The Refusal of One Decent Man,” *The New York Review of Books*, 21 August 2021.

¹⁴¹⁶ Xu Zhangrun (許章潤), “Viral Alert: When Fury Overcomes Fear,” translated and annotated by Geremie R. Barmé, *ChinaFile*, 10 February 2020.

¹⁴¹⁷ “Circular of the General Office of the National Health Commission on Further Strengthening Laboratory Biosafety Supervision and Management in the Normalization of the Novel Coronavirus Pneumonia Epidemic Prevention and Control Efforts” (国家卫生健康委办公厅关于在新冠肺炎疫情常态化防控中进一步加强实验室生物安全监督管理的通知), the *National Health Commission of the People's Republic of China* (Online), NHC Document No. 524 [2020], issued on 06 July 2020, published on 13 July 2020.

¹⁴¹⁸ Ruairidh Brown, “China: Victory Over Coronavirus will be Heralded as Boost for Xi Jinping's Brand of Marxism,” *The Conversation*, 27 May 2020.

¹⁴¹⁹ “Circular of the General Office of the National Health Commission on Further Strengthening Laboratory Biosafety Supervision and Management in the Normalization of the Novel Coronavirus Pneumonia Epidemic Prevention and Control Efforts” (国家卫生健康委办公厅关于在新冠肺炎疫情常态化防控中进一步加强实验室

生物安全监督管理的通知), the *National Health Commission of the People's Republic of China* (Online), NHC Document No. 524 [2020], issued on 06 July 2020, published on 13 July 2020.

¹⁴²⁰ Ibid. The paraphrased text was taken from the following passage: “各地卫生健康行政部门应当要求生物安全实验室严格按照防护要求开展相关实验活动: 新冠病毒培养, 动物感染实验应当在生物安全三级及以上实验室开展; 未经培养的感染性材料的操作应当在生物安全二级及以上实验室进行, 同时采用不低于生物安全三级实验室的个人防护...”

¹⁴²¹ Rowan Jacobsen, “Inside the Risky Bat-Virus Engineering that Links America to Wuhan,” *MIT Technology Review*, 29 June 2021; Rowen Jacobsen, “‘We Never Created a Supervirus.’ Ralph Baric Explains Gain-of-Function Research,” *MIT Technology Review*, 26 July 2021.

¹⁴²² The quoted text is “提升检测能力, 保障检测人员和周围环境安全.” See, “Circular of the General Office of the National Health Commission on Further Strengthening Laboratory Biosafety Supervision and Management in the Normalization of the Novel Coronavirus Pneumonia Epidemic Prevention and Control Efforts” (国家卫生健康委办公厅关于在新冠肺炎疫情常态化防控中进一步加强实验室生物安全监督管理的通知), the *National Health Commission of the People's Republic of China* (Online), NHC Document No. 524 [2020], issued on 06 July 2020, published on 13 July 2020.

¹⁴²³ Ibid. The quoted text is “各地卫生健康委要依法依规严格管理新冠病毒毒株和相关样本, 确保安全.”

¹⁴²⁴ Ibid. The quoted text is “各省级卫生健康行政部门要加强对毒株及相关样本保存单位的监督管理, 严格防范和杜绝未经审批擅自运输的情况发生.”

¹⁴²⁵ Ibid.

¹⁴²⁶ Ibid. The quoted text is “各省级卫生健康行政部门要根据疫情防控需要和实验室生物安全有关要求, 及时研判提出新冠病毒实验室检测生物样本处置意见. 对确需保存的, 应当尽快指定具备保存条件的机构按照相对集中原则进行保存, 或送至国家级菌 (毒) 种保藏中心保藏; 对无需保存的, 由相关机构按照生物安全有关要求及时处理.”

¹⁴²⁷ Ibid. The quoted text is “请各省级卫生健康行政部门督促辖区内高等级生物安全实验室将新冠病毒毒株分离, 分享等相关情况及时报送我委科教司, 同时指导实验室在分离出新冠病毒毒株后 90 天内, 向国家级菌 (毒) 种保藏中心申请保藏, 完成相关实验活动后及时将新冠病毒毒株送交保藏机构保藏.”

¹⁴²⁸ Ibid. Emphasis added. The quoted text is “各省级卫生健康行政部门要切实加强组织领导, 提升实验室生物安全监管能力, 按照属地化, 分级分类的原则开展实验室生物安全监管工作, 强化新冠病毒实验活动监督检查, 指导辖区内相关机构加强生物安全管理, 严格按照《病原微生物实验室生物安全管理条例》及相关技术规范要求开展实验活动, 防止实验室泄露或人员感染, 确保实验室生物安全万无一失.”

¹⁴²⁹ Stephanie Nebehay, “WHO Advance Team Heads to China to Set Up Probe into Coronavirus Origin,” *Reuters*, 10 July 2020; Jamey Keatan, “WHO Advance Team Ends Visit to China to Probe COVID Origin,” *The Associated Press*, 04 August 2020.

¹⁴³⁰ Stephanie Nebehay, “WHO Advance Team Heads to China to Set Up Probe into Coronavirus Origin,” *Reuters*, 10 July 2020.

¹⁴³¹ Ibid.

¹⁴³² Jamey Keatan, “WHO Advance Team Ends Visit to China to Probe COVID Origin,” *The Associated Press*, 04 August 2020.

¹⁴³³ Jeremy Page, Betsy McKay, and Drew Hinshaw, “How the WHO’s Hunt for Covid’s Origins Stumbled in China,” *The Wall Street Journal*, 17 March 2021.

¹⁴³⁴ Stephen McDonell, “Ren Zhiqiang: Outspoken Ex-Real Estate Tycoon Gets 18 Years Jail,” *BBC News*, 22 September 2020.

¹⁴³⁵ Chun Han Wong, “China Sentences Xi Critic Ren Zhiqiang to 18 Years in Prison,” *The Wall Street Journal*, 22 September 2020.

¹⁴³⁶ “Former Property Tycoon Ren Zhiqiang Expelled from Party for Serious Disciplinary Violations,” *The Global Times*, 24 July 2020.

¹⁴³⁷ Wu Jia (吴佳), Yuan Zhiming (袁志明), Tang Hao (唐浩), Liu Jun (刘军), Qin Hao (秦颢), Liu Yi (刘毅), and Wang Lin (王林), “A Disinfectant Solution for Surfaces in High-Level Biosafety Laboratories and Related Preparation Methods,” (一种用于高等级生物安全实验室的物表消毒液及其制备方法), *National Intellectual Property*

Administration of China (Online), application date 13 November 2020, patent authorization date 09 November 2021, Patent Authorization Number: CN 112262846 B.

¹⁴³⁸ Ibid. Its effectiveness against SARS-CoV-2 is mentioned several times in the patent text. Here is one example: “本发明提供了一种高等级生物安全实验室物表消毒液及其制备方法。具备以下有益效果:该消毒液对埃博拉病毒, SARS 冠状病毒, 2019 新型冠状病毒, 艾滋病毒, 基孔肯尼亚 病毒等高致病性病原微生物具有显著杀灭效果。” For an example of its non-corrosiveness toward stainless steel, here is an example: “而且通过在该消毒液中加入纳米镁以显著降低消毒液对金属尤其是对不锈钢的腐蚀作用, 从而避免高等级生物安全实验室生物安全防护设施设备的金属构件被腐蚀后发生高致病性病原微生物泄漏引起生物安全事故。”

¹⁴³⁹ Ibid. The quoted text is “...高等级生物 安全实验室的建设与其他实验室存在显著差别, 实验室建设既需要有各种生物安全防护设 施设备防止病原微生物逃逸, 又要使用消毒剂对高致病性病原微生物进行杀灭。由于生物 安全防护设施设备包括围护结构, 气密门, 化学淋浴, 双扉灭菌器, 活毒废水处理系统, 高效 空气过滤器, 实验室通风系统等大量使用不锈钢等金属材料, 并利用焊接工艺连接成型, 并且在使用消毒剂时需要将消毒剂喷洒到上述设施设备表面, 因此高等级生物安全实验室 在选择消毒剂时, 既要确保消毒剂对高致病性病原微生物具有杀灭作用, 同时还要对不锈 钢等金属构件没有腐蚀作用或者腐蚀作用很小。”

¹⁴⁴⁰ Ibid. Emphasis added. The quoted text is “但在现有消毒剂中, 对不锈钢等金属腐蚀性低的消毒剂消毒效果差, 因不能完全杀灭高致病性病原微生物而不能在高等级生物安全实验室使用, 而对高致病性病原微生物具有杀灭作用的消毒剂对不锈钢等金属均有不同程度的腐蚀作用, 长期使用会导致不锈钢等金属构件发生锈蚀, 从而降低上述设施设备的生 物安全防护作用, 不仅缩短其使用寿命造成经济损失, 甚至导致高致病性病原微生物逃逸 到实验室外部环境中, 进而造成人民生命财产损失并带来严重的社会问题。因此, 研发一种 既能够有效杀灭高致病性病原微生物, 又对不锈钢等金属没有腐蚀性或者腐蚀性很低的消 毒剂十分必要...”

¹⁴⁴¹ Ibid. Emphasis added. The quoted text is “而且通过在该消毒液中加入纳米镁以显著降低消毒液对金属尤其是对不锈钢的腐蚀作用, 从而避免高等级生物安全实验室生物安全防护设施设备的金属构件被腐蚀后发生高致病性病原微生物泄漏引起生物安全事故。”

¹⁴⁴² “Keep Firmly in Mind Your Responsibilities, Hold Fast to the Mission, Be a Pioneer for our Nation in the Realm of High-Level Biosafety – The Achievements of the Zhengdian Lab Party Branch of the Chinese Academy of Sciences Wuhan Institute of Virology (牢记责任, 坚守使命 做我国高等级生物安全领域的开拓者—中科院武汉病毒所郑店实验室党支部事迹), *Wuhan Institute of Virology* (Online), 12 November 2019.

¹⁴⁴³ Ibid. Emphasis added. The quoted text is “例如, 实验室核心区域的围护结构, 实验室团队通过反复测试, 用先进的激光焊接方式替代了传统的胶密封方式, 具有更好的气密性和耐久的效果, P4 团队拥有该技术的自主知识产权; 自主设计自动控制的数学模型, 达到更稳定的压差控制效果等。”

¹⁴⁴⁴ Gilles Demaneuf, “Wuhan BSL-4: Engineering Review,” *Medium.com*, 28 May 2021. The research was conducted by the DRASTIC Research Collective.

¹⁴⁴⁵ Zheng-li Shi, et al., “A Pneumonia Outbreak Associated with a New Coronavirus of Probable Bat Origin,” *Nature*, Volume 579, pages 270–273 (2020), received 20 January 2020, accepted 29 January 2020, originally published online on 03 February 2020 with addendum on 17 November 2020.

¹⁴⁴⁶ Alina Chan and Matt Ridley, *Viral: The Search for the Origin of COVID-19*, (Harper Collins Publishers: New York, November 2021), pg. 33.

¹⁴⁴⁷ “Seven Year Coronavirus Trail From Bat Cave via Wuhan Lab,” *The Sunday Times*, 04 July 2020.

¹⁴⁴⁸ Alina Chan and Matt Ridley, *Viral: The Search for the Origin of COVID-19*, (Harper Collins Publishers: New York, November 2021), pg. 34.

¹⁴⁴⁹ Ibid.

¹⁴⁵⁰ Zheng-li Shi, et al., “A Pneumonia Outbreak Associated with a New Coronavirus of Probable Bat Origin,” *Nature*, Volume 579, pages 270–273 (2020), received 20 January 2020, accepted 29 January 2020, originally published online on 03 February 2020 with addendum on 17 November 2020.

¹⁴⁵¹ Ibid.

¹⁴⁵² Ibid.

¹⁴⁵³ Alina Chan and Matt Ridley, *Viral: The Search for the Origin of COVID-19*, (Harper Collins Publishers: New York, November 2021), pg. 23, 34.

¹⁴⁵⁴ Ibid, pg. 23.

¹⁴⁵⁵ Ibid, pg. 34.

¹⁴⁵⁶ “Wuhan Institute of Virology Holds 2020 Annual Training Class for Biosafety Laboratory Management and Experimental Techniques” (武汉病毒所举办 2020 年生物安全实验室管理与实验技术培训班), *Wuhan Institute of Virology* (Online), 30 November 2020.

¹⁴⁵⁷ “Wuhan Institute of Virology Holds 2019 Training Class on Biosafety Laboratory Management and Techniques for Conducting Experiments” (武汉病毒所举办 2019 年生物安全实验室管理与实验技术培训班), *Wuhan Institute of Virology* (Online), 28 November 2019.

¹⁴⁵⁸ “Wuhan Institute of Virology Holds 2020 Annual Training Class for Biosafety Laboratory Management and Experimental Techniques” (武汉病毒所举办 2020 年生物安全实验室管理与实验技术培训班), *Wuhan Institute of Virology* (Online), 30 November 2020.

¹⁴⁵⁹ Ibid. The NPC official was Cao Yang, the deputy director of the Administrative Law Office of the Legal Work Subcommittee of the National People’s Congress Standing Committee (全国人大常委会法工委行政法室副处长曹阳).

¹⁴⁶⁰ “Wuhan Institute of Virology Launches Training on Safety Work” (武汉病毒所开展安全工作培训), *Wuhan Institute of Virology* (Online), 21 November 2019.

¹⁴⁶¹ “Wuhan Municipal People’s Government Circular on the Publication of the Wuhan Municipal Overall Emergency Response Contingency Plans for Sudden Incidents” (市人民政府关于印发武汉市突发事件总体应急预案的通知), first issued on 07 January 2021, published in the *Official Bulletin of the Wuhan Municipal People’s Government* (武汉市人民政府公报), Issue No. 2 of 2021 (Overall Issue 674), pg. 24.

¹⁴⁶² Jeremy Brown, “How the Party Handles Accidents,” *China Digital Times*, 10 August 2017; Alexander Boyd, “How Xiaohongshu Censors ‘Sudden Incidents’,” *China Digital Times*, 27 July 2022.

¹⁴⁶³ The quoted texts are “突发事件分类分级,” and “病原微生物菌毒株事件,” and “公共卫生事件.” See, “Wuhan Municipal People’s Government Circular on the Publication of the Wuhan Municipal Overall Emergency Response Contingency Plans for Sudden Incidents” (市人民政府关于印发武汉市突发事件总体应急预案的通知), first issued on 07 January 2021, published in the *Official Bulletin of the Wuhan Municipal People’s Government* (武汉市人民政府公报), Issue No. 2 of 2021 (Overall Issue 674), pg. 25.

¹⁴⁶⁴ Ibid. Emphasis added. The quoted text is “主要包括传染病疫情, 食品药品安全事件, 群体性中毒感染事件, 病原微生物菌毒株事件, 动物疫情事件, 群体性不明原因疫病, 以及其他严重影响公众健康和生命安全的事件.”

¹⁴⁶⁵ Ibid, pg. 42. The quoted text is “国家重点生物实验室生物安全事件.” On page 28, the directive also provides the following types of “sudden incidents” that the health commission is responsible for: “市卫生健康委: 传染病事件, 群体性中毒, 感染事件, 病原微生物, 菌毒株事件, 群体性不明原因疾病.”

¹⁴⁶⁶ For sake of comparison, the original 2013 document can be found here:
http://www.wuhan.gov.cn/zwgk/xgk/zfwj/bgtwj/202003/t20200316_974443.shtml

¹⁴⁶⁷ Drew Hinshaw and Jeremy Page, “WHO Mission to Look for Answers to Covid-19’s Origin in Wuhan,” *The Wall Street Journal*, 14 January 2021; Gabriel Crossley, “WHO’s Wuhan Probe Ends, U.S.-China Bickering Over COVID Continues,” *Reuters*, 10 February 2021.

¹⁴⁶⁸ Jeremy Page, Betsy McKay, and Drew Hinshaw, “How the WHO’s Hunt for Covid’s Origins Stumbled in China,” *The Wall Street Journal*, 17 March 2021.

¹⁴⁶⁹ Drew Hinshaw and Jeremy Page, “WHO Mission to Look for Answers to Covid-19’s Origin in Wuhan,” *The Wall Street Journal*, 14 January 2021.

¹⁴⁷⁰ Jeremy Page, Betsy McKay, and Drew Hinshaw, “How the WHO’s Hunt for Covid’s Origins Stumbled in China,” *The Wall Street Journal*, 17 March 2021.

¹⁴⁷¹ Drew Hinshaw and Jeremy Page, “WHO Mission to Look for Answers to Covid-19’s Origin in Wuhan,” *The Wall Street Journal*, 14 January 2021.

¹⁴⁷² Jamey Keatan, “WHO Advance Team Ends Visit to China to Probe COVID Origin,” *The Associated Press*, 04 August 2020.

¹⁴⁷³ Jeremy Page, Betsy McKay, and Drew Hinshaw, “How the WHO’s Hunt for Covid’s Origins Stumbled in China,” *The Wall Street Journal*, 17 March 2021.

¹⁴⁷⁴ Ibid.

¹⁴⁷⁵ Ibid.

¹⁴⁷⁶ Ibid.

¹⁴⁷⁷ Ibid.

¹⁴⁷⁸ See, “Guo Shengkun: Firmly Launch a Nationwide Education and Rectification of Political-Legal Forces to Bring a New Look and New Results to the Celebration of the Party’s Centennial” (郭声琨：扎实开展全国政法队伍教育整顿以新面貌新业绩庆祝建党 100 周年), *China Peace Network* (中国长安网), 27 February 2021. Lest its Orwellian name confuse readers, let me clarify that the “China Peace Network” is the official website of the CCP Central Political and Legal Commission.

¹⁴⁷⁹ Ibid.

¹⁴⁸⁰ Willy Wo-Lap Lam, “As Rival Factions Gain Traction, Xi Seeks to Secure Support from the Military,” *The Jamestown Foundation* (Online), 25 January 2022.

¹⁴⁸¹ “Guo Shengkun: Firmly Launch a Nationwide Education and Rectification of Political-Legal Forces to Bring a New Look and New Results to the Celebration of the Party’s Centennial” (郭声琨：扎实开展全国政法队伍教育整顿以新面貌新业绩庆祝建党 100 周年), *China Peace Network* (中国长安网), 27 February 2021.

¹⁴⁸² Ibid. The quoted text is “突出筑牢政治忠诚, 清除害群之马, 整治顽瘴痼疾.”

¹⁴⁸³ Ibid. The quoted text is “开展政法队伍教育整顿, 是坚持全面从严管党治警, 推进政法队伍自我革命的必然要求. 要发扬彻底的革命精神, 针对执法司法权运行的特殊性, 紧扣扫黑除恶暴露出来的深层次问题, 坚持全链条发力, 全系统整治, 刀刃向内, 刮骨疗毒, 坚决清除害群之马, 彻底整治顽瘴痼疾.”

¹⁴⁸⁴ “Xi Jinping Attends Central Political Legal Commission Work Conference and Delivers Important Speech,” (习近平出席中央政法工作会议并发表重要讲话), *Xinhua News Agency*, 16 January 2019.

¹⁴⁸⁵ “On the Political-Legal Battlefield, the Self-Revolution of Turning the Blade Inward Yields Obvious Results” (政法战线刀刃向内的自我革命成效明显), *The Supreme People’s Procuratorate of the People’s Republic of China* (Online), 30 August 2021; Willy Wo-Lap Lam, “Xi Facing Opposition on Different Fronts in Run-Up to Key Party Plenum,” *The Jamestown Foundation* (Online), 23 September 2021.

¹⁴⁸⁶ Ibid.

¹⁴⁸⁷ The five were the Ecological and Environmental Department, the Education Department, the Science and Technology Department, the Provincial Health Commission, and the Emergency Response Management Department. See, “Circular on Taking the Next Step to Strengthen Environmental Management Work for Laboratory Hazardous Waste,” (关于进一步加强实验室危险废物环境管理工作的通知), *Hubei Provincial People’s Government* (Online), 01 June 2021.

¹⁴⁸⁸ Ibid. The quoted text is “年产生量 3 吨以上的应建设规范且满足防扬散, 防流失, 防渗漏等要求的贮存设施并落实专人管理.”

¹⁴⁸⁹ Ibid. The quoted text is “对涉及感染性废物的病原微生物实验室, 应按照 ‘实验室生物安全通用要求’ (GB19489) 等标准规范要求加强对感染性废物的消毒处理和安全贮存.”

¹⁴⁹⁰ Tang Huashan (汤华山), Zou Jing (邹靖), and Jin Fengyin (金凤银), “A Temporary Storage Unit for Hazardous Solid Waste for Use in High Level Biosafety Laboratories,” (一种高等级生物安全实验室用危险固体废物临时存放装置), *National Intellectual Property Administration of China* (Online), application date 15 October 2021, patent authorization date 11 January 2022, Patent Authorization Number: CN 113911590 A.

¹⁴⁹¹ Xiao Xiao, et. al., “Animal Sales from Wuhan Wet Markets Immediately Prior to the COVID-19 Pandemic,” *Scientific Reports*, 11, Article number: 11898 (2021), published online on 07 June 2021.

¹⁴⁹² Ibid.

¹⁴⁹³ Ibid; David Engber, “The Lab Leak Theory Meets its Perfect Match,” *The Atlantic*, 24 November 2021.

¹⁴⁹⁴ “WHO-Convended Global Study of Origins of SARS-CoV-2: China Part,” Joint WHO-China Study: 14 January to 10 February 2021, *World Health Organization* (Online), 30 March 2021, pg. 98.

¹⁴⁹⁵ “The WHO’s Chief Says It Was Premature To Rule Out A Lab Leak As The Pandemic’s Origin,” *The Associated Press*, 15 July 2021.

¹⁴⁹⁶ Ibid.

¹⁴⁹⁷ See, Matthew Impelli, “Member of WHO’s Wuhan Investigative Team Faults U.S. Intel on COVID,” *Newsweek*, 10 February 2021; Jimmy Quinn, “The Growing Scrutiny of Peter Daszak’s Chinese Research Collaboration,” *The National Review*, 25 March 2021; Jim Geraghty, “China Apologist Peter Daszak Has Some Explaining to Do,” *The National Review*, 22 June 2021; Jerry Dunleavy, “Wuhan Lab Collaborator Recused from Lancet’s COVID-19 Origins Investigation,” *The Washington Examiner*, 22 June 2021.

¹⁴⁹⁸ “The WHO's Chief Says It Was Premature To Rule Out A Lab Leak As The Pandemic's Origin,” *The Associated Press*, 15 July 2021.

¹⁴⁹⁹ The relevant text is “甚至于计划领导人在南京举行纪念活动时不轨, 被安全部人员阻止了罪恶活动。” “Mainland Media Carelessly Reveal Jiangsu Police Officials Plotted Something Bad Against Leaders,” (陆媒披露江苏警官策划对领导人不轨), *Radio Free Asia*, 16 September 2021; Willy Wo-Lop Lam, “Xi Facing Opposition on Different Fronts in Run-Up to Key Party Plenum,” *The Jamestown Foundation* (Online), 23 September 2021.

¹⁵⁰⁰ “Mainland Media Carelessly Reveal Jiangsu Police Officials Plotted Something Bad Against Leaders,” (陆媒披露江苏警官策划对领导人不轨), *Radio Free Asia*, 16 September 2021.

¹⁵⁰¹ Willy Wo-Lop Lam, “Xi Facing Opposition on Different Fronts in Run-Up to Key Party Plenum,” *The Jamestown Foundation* (Online), 23 September 2021.

¹⁵⁰² The quoted text is “妄议中央大政方针, 辱骂国家主要领导人。” See, “Mainland Media Carelessly Reveal Jiangsu Police Officials Plotted Something Bad Against Leaders,” (陆媒披露江苏警官策划对领导人不轨), *Radio Free Asia*, 16 September 2021.

¹⁵⁰³ Willy Wo-Lop Lam, “Xi Facing Opposition on Different Fronts in Run-Up to Key Party Plenum,” *The Jamestown Foundation* (Online), 23 September 2021; Laura He, “China Sentences Former Top Finance Executive to Death for Bribery,” *CNN*, 06 January 2021.

¹⁵⁰⁴ Alexander Boyd, “‘Political Clique’ Purged from State Security Apparatus Ahead of Party Congress,” *China Digital Times*, 07 October 2022. Matthew Walsh, “Chinese Former Senior Security Official Faces Life in Prison For Bribery,” *International Business Times*, 23 September 2022.

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¹⁵⁰⁷ Ibid. The relevant text is “要强化生物资源安全监管, 制定完善生物资源和人类遗传资源目录。”

¹⁵⁰⁸ For one representative example, see Tan Xueping (谭雪平) and Yang Yu (杨宇), “Genetic Warfare: A New Shadow Enveloping Humanity” (基因战争, 笼罩人类的新阴影), *The People’s Liberation Army Daily*, 08 November 2018.

¹⁵⁰⁹ “Premier Li Keqiang Signs State Council Order announcing ‘the People’s Republic of China Human Hereditary Resources Management Regulations’” (李克强签署国务院令公布《中华人民共和国人类遗传资源管理条例》), *Xinhua* reprinted in the *PLA Daily*, 10 June 2019.

¹⁵¹⁰ Li Li (李莉), “Zhang Jiwen: Firmly Construct an Epidemic Inspection Line of Defense at Ports of Entry and Strictly Maintain Biosecurity at the Nation’s Gates” (张际文: 筑牢口岸检疫防线 严守国门生物安全), *Sohu.com*, 28 March 2019.

¹⁵¹¹ The quoted text is “要加强入境检疫, 强化潜在风险分析和违规违法行为处罚, 坚决守牢国门关口。对已经传入并造成严重危害的, 要摸清底数。” See, “At the Politburo’s 33rd Collective Study Session, Xi Jinping Emphasizes Strengthening Prevention and Control of Biosafety/Biosecurity Risks and Building a System to Improve the Capabilities of the State to Control in Biosafety/Biosecurity” (习近平在中共中央政治局第三十三次集体学习时强调 加强国家生物安全风险防控和治理体系建设 提高国家生物安全治理能力), *China National Radio* (中央人民广播电台), 30 September 2021.

¹⁵¹² Ibid. The quoted text is “要加强对国内病原微生物实验室生物安全的管理, 严格执行有关标准规范, 严格管理实验样本, 实验动物, 实验活动废弃物。”

¹⁵¹³ Lin Tingyao (林庭瑶) and Ni Huairan (倪懷仁), “Exclusively Obtained Red-Letterhead Document: The Chinese Communist Party Concealed Wuhan Epidemic” (獨家取得紅頭文件: 中共隱瞞武漢疫情), *The Storm Media* (瘋傳媒), 15 April 2020.

¹⁵¹⁴ Ministry of Agriculture and Rural Affairs (2020 No. 15), Ministry of Education, Ministry of Science and Technology, the National Health Commission, the General Administration of Customs, the National Forestry and Grasslands Administration, and the Chinese Academy of Sciences, “Circular on Strengthening Biosecurity and Biosafety Management of Animal Pathogen Molecular Biology Labs” (关于加强动物病原微生物实验室生物安全管理的通知), *Chinese Academy of Sciences* (Online), issued on 09 February 2020, posted online on 02 March 2020.

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¹⁵¹⁷ The quoted text is “要织牢织密生物安全风险监测预警网络, 健全监测预警体系, 重点加强基层监测站点建设, 提升末端发现能力. 要快速感知识别新发突发传染病... 做到早发现, 早预警, 早应对.” See, “At the Politburo’s 33rd Collective Study Session, Xi Jinping Emphasizes Strengthening Prevention and Control of Biosafety/Biosecurity Risks and Building a System to Improve the Capabilities of the State to Control in Biosafety/Biosecurity” (习近平在中共中央政治局第三十三次集体学习时强调 加强国家生物安全风险防控和治理体系建设 提高国家生物安全治理能力), *China National Radio* (中央人民广播电台), 30 September 2021.

¹⁵¹⁸ Ibid. Emphasis added. The quoted text is “中共中央总书记习近平在主持学习时强调, 生物安全关乎人民生命健康, 关乎国家长治久安, 关乎中华民族永续发展, 是国家总体安全的重要组成部分, 也是影响乃至重塑世界格局的重要力量. 要深刻认识新形势下加强生物安全建设的重要性和紧迫性.”

¹⁵¹⁹ Ibid. Emphasis added. The quoted text is “习近平强调, 现在, 传统生物安全问题和新型生物安全风险相互叠加, 境外生物威胁和内部生物风险交织并存, 生物安全风险呈现出许多新特点, 我国生物安全风险防控和治理体系还存在短板弱项. 必须科学分析我国生物安全形势, 把握面临的风险挑战, 明确加强生物安全建设的思路和举措.”

¹⁵²⁰ Xi Jinping (习近平), “Xi Jinping: Remarks to the Central Committee’s Politburo Standing Committee Meeting on Responding to the Novel Coronavirus Pneumonia Epidemic” (习近平: 在中央政治局常委会会议研究应对新型冠状病毒肺炎疫情工作时的讲话) *Seeking Truth* (求是), 15 February 2020; “Xi Jinping Chairs and Convenes the 12th Meeting of the Central Commission on Comprehensively Deepening Reform and Emphasizes: Improve the System and Mechanisms for Major Epidemic Prevention and Control and Strengthen the National Public Health Emergency Management System” (习近平主持召开中央全面深化改革委员会第十二次会议强调: 完善重大疫情防控体制机制 健全国家公共卫生应急管理体系), *Xinhua News Agency* re-posted on the *Central Government of the People’s Republic of China* (Online), 14 February 2020; “Xi Jinping: Speech at the Conference on Planning and Promoting Prevention and Control for the Novel Coronavirus Pneumonia Epidemic and Social-Economic Development Work Deployment” (习近平: 在统筹推进新冠肺炎疫情防控和经济社会发展工作部署会议上的讲话), *Xinhua News Agency* re-posted on the *Central Government of the People’s Republic of China* (Online), 24 February 2020; “Xi Jinping: Build a Strong Public Health System to Provide Powerful Protection for the People’s Health” (习近平: 构建起强大的公共卫生体系 为维护人民健康提供有力保障), *Seeking Truth* (求是) reprinted by *Xinhua News Agency*, 15 September 2020.

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Institute of Virology Organizes Centralized Study on the Educational Theme of ‘Staying True to our Original Aspiration, Keeping Firmly in Mind our Mission’,” (武汉病毒所组织 “不忘初心，牢记使命” 主题教育集中学习), *Wuhan Institute of Virology* (Online), 09 July 2019; “Safe Production has No ‘Inspection-Exempted Work Units’, Much Less ‘No Worries Work Units’,” (安全生产没有 “免检单位,” 更没有 “放心单位”), *Chinese Academy of Sciences* (Online), 03 September 2019; Wang Xiaoli (王小理) and Zhou Dongsheng (周冬生), “Looking toward the International Biosecurity Situation in 2035,” (面向 2035 年的国际生物安全形势), *The Study Times* (学习时报), 20 December 2019.

¹⁵²² The quoted text is “习近平强调, 加强生物安全建设是一项长期而艰巨的任务, 需要持续用力, 扎实推进. 各级党委 (党组) 和政府要切实把握思想认识和行动统一到党中央决策部署上来, 把生物安全工作责任落到实处, 做到守土有责, 守土尽责.” See, “At the Politburo’s 33rd Collective Study Session, Xi Jinping Emphasizes Strengthening Prevention and Control of Biosafety/Biosecurity Risks and Building a System to Improve the Capabilities of the State to Control in Biosafety/Biosecurity” (习近平在中共中央政治局第三十三次集体学习时强调 加强国家生物安全风险防控和治理体系建设 提高国家生物安全治理能力), *China National Radio* (中央人民广播电台), 30 September 2021.

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¹⁵²⁴ “Former Vice Minister, Member of the Ministry of Public Security Party Committee Sun Lijun is Expelled from the Party and Public Office for Severely Violating the Law and [Political] Discipline” (公安部原党委委员, 副部长孙力军严重违纪违法被开除党籍和公职), *Xinhua News Agency*, 30 September 2020; Jessie Turland, “China’s Top Disciplinary Body Moves Against Ex-Security Officials Fu Zhenghua, Sun Lijun,” *The Diplomat*, 06 October 2021; “Former Chinese Deputy Police Minister Sentenced for Graft,” *The Associated Press*, 23 September 2022.

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¹⁵²⁶ “Former Chinese Deputy Police Minister Sentenced for Graft,” *The Associated Press*, 23 September 2022.

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¹⁵³⁴ Ibid. The relevant text is “解决了危险固体废物因错误放置或取出而造成病毒泄漏的问题.”

¹⁵³⁵ Ibid. The relevant text is “在进行危险固体废弃物的存取工作时, 必须至少双人同时操作才能将架体进行翻转, 而架体只有在翻转后才能将存放箱前侧所设置的仓门打开的设计, 避免了因单人操作打开仓门进行存放时可能会出现危险固体废物被错误存放或渗漏的风险.”

¹⁵³⁶ Ibid. The relevant text is “当使用者存放或取出垃圾后, 通过将手部伸入到架体中靠近风淋槽的一侧位置, 并通过风淋槽喷出液体对手部进行消毒, 解决了危险固体废物因错误放置或取出而造成病毒泄漏的问题.”

Exhibit

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Subject: China Opens First Bio Safety Level 4 Laboratory

1. (SBU) **Summary and Comment:** The Chinese Academy of Sciences (CAS) has recently established what is reportedly China's first Biosafety Level 4 (BSL-4) laboratory in Wuhan. This state-of-the-art facility is designed for prevention and control research on diseases that require the highest level of biosafety and biosecurity containment. Ultimately, scientists hope the lab will contribute to the development of new antiviral drugs and vaccines, but its current productivity is limited by a shortage of the highly trained technicians and investigators required to safely operate a BSL-4 laboratory and a lack of clarity in related Chinese government policies and guidelines. (b)(5)

(b)(5)

(b)(5)

End Summary and Comment.

China Investing in Infectious Disease Control

2. (U) Between November 2002 and July 2003, China faced an outbreak of Severe Acute Respiratory Syndrome (SARS), which, according to the World Health Organization, resulting in 8,098 cases and leading to 774 deaths reported in 37 countries. A majority of cases occurred in China, where the fatality rate was 9.6%. This incident convinced China to prioritize international cooperation for infectious disease control. An aspect of this prioritization was China's work with the Jean Merieux BSL-4 Laboratory in Lyon, France, to build China's first high containment laboratory at Wuhan's Institute of Virology (WIV), an institute under the auspices of the Chinese Academy of Sciences (CAS). Construction took 11 years and \$44 million USD, and construction on the facility was completed on January 31, 2015. Following

two years of effort, which is not unusual for such facilities, the WIV lab was accredited in February 2017 by the China National Accreditation Service for Conformity Assessment. It occupies four floors and consists of over 32,000 square feet. WIV leadership now considers the lab operational and ready for research on class-four pathogens (P4), among which are the most virulent viruses that pose a high risk of aerosolized person-to-person transmission.

Unclear Guidelines on Virus Access and a Lack of Trained Talent Impede Research

3. (SBU) In addition to accreditation, the lab must also receive permission from the National Health and Family Planning Commission (NHFPC) to initiate research on specific highly contagious pathogens. According to some WIV scientists, it is unclear how NHFPC determines what viruses can or cannot be studied in the new laboratory. To date, WIV has obtained permission for research on three viruses: Ebola virus, Nipah virus, and Xinjiang hemorrhagic fever virus (a strain of Crimean Congo hemorrhagic fever found in China's Xinjiang Province). Despite this permission, however, the Chinese government has not allowed the WIV to import Ebola viruses for study in the BSL-4 lab. Therefore, WIV scientists are frustrated and have pointed out that they won't be able to conduct research project with Ebola viruses at the new BSL-4 lab despite of the permission.

(b)(6)

(b)(6)

Thus, while the BSL-4 lab is ostensibly fully accredited, its utilization is limited by lack of access to specific organisms and by opaque government review and approval processes. As long as this situation continues, Beijing's commitment to prioritizing infectious disease control - on the regional and international level, especially in relation to highly pathogenic viruses, remains in doubt.

(b)(6)

noted that the new lab has a serious shortage of appropriately trained technicians and investigators needed to safely operate this high-containment laboratory. University of Texas Medical Branch in Galveston (UTMB), which has one of several well-established BSL-4 labs in the United States (supported by the National Institute of Allergy and Infectious Diseases (NIAID of NIH)), has scientific collaborations with WIV, which may help alleviate this talent gap over time. Reportedly, researchers from GTMB are helping train technicians who work in the WIV BSL-4 lab. Despite this, (b)(6) they would welcome more help from U.S. and international organizations as they establish "gold standard" operating procedures and training courses for the first time in China. As China is building more BSL-4 labs, including one in Harbin Veterinary Research Institute subordinated to the Chinese Academy of Agricultural Sciences (CAAS) for veterinary research use (b)(6) the training for technicians and investigators working on dangerous pathogens will certainly be in demand.

Despite Limitations, WIV Researchers Produce SARS Discoveries

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6. (SBU) The ability of WIV scientists to undertake productive research despite limitations on the use of the new BSL-4 facility is demonstrated by a recent publication on the origins of SARS. Over a five-year study, (b)(6) (and their research team) widely sampled bats in Yunnan province with funding support from NIAID/NIH, USAID, and several Chinese funding agencies. The study results were published in PLoS Pathogens online on Nov. 30, 2017 (1), and it demonstrated that a SARS-like coronavirus isolated from horseshoe bats in a single cave contain all the building blocks of the pandemic SARS-coronavirus genome that caused the human outbreak. These results strongly suggest that the highly pathogenic SARS-coronavirus originated in this bat population. Most importantly, the researchers also showed that various SARS-like coronaviruses can interact with ACE2, the human receptor identified for SARS-coronavirus. This finding strongly suggests that SARS-like coronaviruses from bats can be transmitted to humans to cause SARS-like disease. From a public health perspective, this makes the continued surveillance of SARS-like coronaviruses in bats and study of the animal-human interface critical to future emerging coronavirus outbreak prediction and prevention. (b)(5) (b)(5) WIV scientists are allowed to study the SARS-like coronaviruses isolated from bats while they are precluded from studying human-disease causing SARS coronavirus in their new BSL-4 lab until permission for such work is granted by the NHFCP.

1. Hu B, Zeng L-P, Yang X-L, Ge X-Y, Zhang W, Li B, et al. (2017) Discovery of a rich gene pool of bat SARS-related coronaviruses provides new insights into the origin of SARS coronavirus. PLoS Pathog 13(11): e1006698. <https://doi.org/10.1371/journal.ppat.1006698>

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3

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Fact Sheet: Activity at the Wuhan Institute of Virology

FACT SHEET

OFFICE OF THE SPOKESPERSON

JANUARY 15, 2021

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For more than a year, the Chinese Communist Party (CCP) has systematically prevented a transparent and thorough investigation of the COVID-19 pandemic's origin, choosing instead to devote enormous resources to deceit and disinformation. Nearly two million people have died. Their families deserve to know the truth. Only through transparency can we learn what caused this pandemic and how to prevent the next one.

The U.S. government does not know exactly where, when, or how the COVID-19 virus—known as SARS-CoV-2—was transmitted initially to humans. We have not determined whether the outbreak began through contact with infected animals or was the result of an accident at a laboratory in Wuhan, China.

The virus could have emerged naturally from human contact with infected animals, spreading in a pattern consistent with a natural epidemic. Alternatively, a laboratory accident could resemble a natural outbreak if the initial exposure included only a few individuals and was compounded by asymptomatic infection. Scientists in China have researched animal-derived coronaviruses under conditions that increased the risk for accidental and potentially unwitting exposure.

The CCP's deadly obsession with secrecy and control comes at the expense of public health in China and around the world. The previously undisclosed information in this fact sheet, combined with open-source reporting, highlights three elements about COVID-19's origin that deserve greater scrutiny:

1. Illnesses inside the Wuhan Institute of Virology (WIV):

- ◆ The U.S. government has reason to believe that several researchers inside the WIV became sick in autumn 2019, before the first identified case of the outbreak, with symptoms consistent with both COVID-19 and common seasonal illnesses. This raises questions about the credibility of WIV senior researcher Shi Zhengli's public claim that there was "zero infection" among the WIV's staff and students of SARS-CoV-2 or SARS-related viruses.
- ◆ Accidental infections in labs have caused several previous virus outbreaks in China and elsewhere, including a 2004 SARS outbreak in Beijing that infected nine people, killing one.
- ◆ The CCP has prevented independent journalists, investigators, and global health authorities from interviewing researchers at the WIV, including those who were ill in the fall of 2019. Any credible inquiry into the origin of the virus must include interviews with these researchers and a full accounting of their previously unreported illness.

2. Research at the WIV:

- ◆ Starting in at least 2016 – and with no indication of a stop prior to the COVID-19 outbreak – WIV researchers conducted experiments involving RaTG13, the bat coronavirus identified by the WIV in January 2020 as its closest sample to SARS-CoV-2 (96.2% similar). The WIV became

a focal point for international coronavirus research after the 2003 SARS outbreak and has since studied animals including mice, bats, and pangolins.

- ◆ The WIV has a published record of conducting “gain-of-function” research to engineer chimeric viruses. But the WIV has not been transparent or consistent about its record of studying viruses most similar to the COVID-19 virus, including “RaTG13,” which it sampled from a cave in Yunnan Province in 2013 after several miners died of SARS-like illness.
- ◆ WHO investigators must have access to the records of the WIV’s work on bat and other coronaviruses before the COVID-19 outbreak. As part of a thorough inquiry, they must have a full accounting of why the WIV altered and then removed online records of its work with RaTG13 and other viruses.

3. Secret military activity at the WIV:

- ◆ Secrecy and non-disclosure are standard practice for Beijing. For many years the United States has publicly raised concerns about China’s past biological weapons work, which Beijing has neither documented nor demonstrably eliminated, despite its clear obligations under the Biological Weapons Convention.
- ◆ Despite the WIV presenting itself as a civilian institution, the United States has determined that the WIV has collaborated on publications and secret projects with China’s military. The WIV has engaged in classified research, including laboratory animal experiments, on behalf of the Chinese military since at least 2017.
- ◆ The United States and other donors who funded or collaborated on civilian research at the WIV have a right and obligation to determine whether any of our research funding was diverted to secret Chinese military projects at the WIV.

Today’s revelations just scratch the surface of what is still hidden about COVID-19’s origin in China. Any credible investigation into the origin of COVID-19 demands complete, transparent access to the research labs in Wuhan, including their facilities, samples, personnel, and records.

As the world continues to battle this pandemic – and as WHO investigators begin their work, after more than a year of delays – the virus’s origin remains uncertain. The United States will continue

to do everything it can to support a credible and thorough investigation, including by continuing to demand transparency on the part of Chinese authorities.

TAGS

- Bureau of East Asian and Pacific Affairs
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Key Takeaways

The IC assesses that SARS-CoV-2, the virus that causes COVID-19, probably emerged and infected humans through an initial small-scale exposure that occurred no later than November 2019 with the first known cluster of COVID-19 cases arising in Wuhan, China in December 2019. In addition, the IC was able to reach broad agreement on several other key issues. We judge the virus was not developed as a biological weapon. Most agencies also assess with low confidence that SARS-CoV-2 probably was not genetically engineered; however, two agencies believe there was not sufficient evidence to make an assessment either way. Finally, the IC assesses China's officials did not have foreknowledge of the virus before the initial outbreak of COVID-19 emerged.

After examining all available intelligence reporting and other information, though, the IC remains divided on the most likely origin of COVID-19. All agencies assess that two hypotheses are plausible: natural exposure to an infected animal and a laboratory-associated incident.

- Four IC elements and the National Intelligence Council assess with low confidence that the initial SARS-CoV-2 infection was most likely caused by natural exposure to an animal infected with it or a close progenitor virus—a virus that probably would be more than 99 percent similar to SARS-CoV-2. These analysts give weight to China's officials' lack of foreknowledge, the numerous vectors for natural exposure, and other factors.
- One IC element assesses with moderate confidence that the first human infection with SARS-CoV-2 most likely was the result of a laboratory-associated incident, probably involving experimentation, animal handling, or sampling by the Wuhan Institute of Virology. These analysts give weight to the inherently risky nature of work on coronaviruses.
- Analysts at three IC elements remain unable to coalesce around either explanation without additional information, with some analysts favoring natural origin, others a laboratory origin, and some seeing the hypotheses as equally likely.
- Variations in analytic views largely stem from differences in how agencies weigh intelligence reporting and scientific publications, and intelligence and scientific gaps.

The IC judges they will be unable to provide a more definitive explanation for the origin of COVID-19 unless new information allows them to determine the specific pathway for initial natural contact with an animal or to determine that a laboratory in Wuhan was handling SARS-CoV-2 or a close progenitor virus before COVID-19 emerged.

- The IC—and the global scientific community—lacks clinical samples or a complete understanding of epidemiological data from the earliest COVID-19 cases. If we obtain information on the earliest cases that identified a location of interest or occupational exposure, it may alter our evaluation of hypotheses.

China's cooperation most likely would be needed to reach a conclusive assessment of the origins of COVID-19. Beijing, however, continues to hinder the global investigation, resist sharing information and blame other countries, including the United States. These actions reflect, in part, China's government's own uncertainty about where an investigation could lead as well as its frustration the international community is using the issue to exert political pressure on China.

Exhibit

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INTELLIGENCE ENTERPRISE



Homeland
Security

HOMELAND INTELLIGENCE ARTICLE

1 May 2020

(U) Economic Security Mission Center

(U//FOUO) New Analytic Technique Indicates China Likely Hid Severity of COVID-19 from the International Community While it Stockpiled Medical Supplies

(U//FOUO) **Scope.** This Article provides insight to senior policymakers about when China was aware of the severity of COVID-19 based upon trade data showing its stockpiling of key medical supplies. This product continues ESMC's analysis predicting both the scarcity of medical supplies and assessing the cause for those shortages. The information cutoff date is 20 April 2020.

(U//FOUO) Prepared by the DHS Intelligence Enterprise (DHS IE) Economic Security Mission Center (ESMC). Coordinated with the DHS IE Counterintelligence Mission Center (CIMC), DHS IE Cyber Mission Center (CYMC), DHS IE Transnational Organized Crime Mission Center (TOCMC), the Current and Emerging Threats Center, CBP, the Cybersecurity and Infrastructure Security Agency (CISA), Homeland Security Investigations (HSI), and USCG.

(U//FOUO) We assess the Chinese Government intentionally concealed the severity of COVID-19 from the international community in early January while it stockpiled medical supplies by both increasing imports and decreasing exports. We further assess the Chinese Government attempted to hide its actions by denying there were export restrictions and obfuscating and delaying provision of its trade data. We have moderate confidence in this assessment because trade data shows that China likely stockpiled medical supplies for domestic use before its official notification to the World Health Organization (WHO) that COVID-19 was contagious.

- » (U//FOUO) China likely delayed informing the WHO on 20 January 2020, that COVID-19 was a contagion, until after it purchased medical supplies from abroad.¹ Bulk orders generally require two to four weeks to be delivered, and in January, China substantially increased its imports of surgical facemasks (278 percent), surgical gowns (72 percent), and surgical gloves (32 percent), among other items, according to (b)(7)(E); (b)(3) 6 U.S.C. § 121(d)(9). This means the Chinese Government would have started mobilizing its purchasing agents and identifying international suppliers in early January for those purchases to be reflected in worldwide January export statistics.

(U) DHS I&A (b) (3) (B)

(U//FOUO) In order to identify whether changes in Chinese imports or exports deviated from what could normally be expected, we evaluated the standard deviation from the mean for 38 categories of medical products to identify statistically significant increases and decreases. Specifically, we compared world trade data for the period of October 2019-February 2020 with the prior five years of trade data. We identified several products that exhibited at least a two-sigma standard deviation, meaning there is a **95 percent probability** that these increased imports and decreased exports of medical supplies were not within a normal range. Finally, we used worldwide trade data for these 38 types of medical supplies at the 6-digit Harmonized Tariff Schedule (HTS) numbers, as they are the most specific categories that are harmonized between countries and would yield proper comparisons.^b

IA-44130-20

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- » (U//FOUO) China likely cut its exports of medical supplies prior to its January WHO notification that COVID-19 is a contagion. Global trade data from February shows a significant decline in worldwide imports from China of surgical gloves (48 percent), surgical gowns (71 percent), surgical facemasks (48 percent), medical ventilators (45 percent), intubation kits (56 percent), thermometers (53 percent), and cotton balls and swabs (58 percent), among others.^c Because we relied upon worldwide imports of Chinese medical supplies as a proxy for Chinese exports, the February worldwide import data likely reflects a January reduction in exports from China as cargo typically takes over 30 days to ship via ocean freight.^{5,d} We assume these were primarily shipped by ocean freight and not air freight as 90 percent of world trade transits via ocean freight and high volume/low value merchandise is typically shipped via ocean freight as air is more expensive.^{6,7}
- » (U//FOUO) In its communications, China intentionally concealed its trade activity by publicly denying it has ever imposed an export ban on masks and other medical supplies, combining its publicly released January and February trade figures to likely conceal the details of its import and export of medical supplies, and delayed release of key trade data, according to DHS I&A (b) (3) (7) (E) [REDACTED]

(U) **Persistent analysis of worldwide trade data flows would allow DHS to provide early warning in the future of other threats.** While DHS has an increased level of data sharing with some trade partners, it does not provide the coverage necessary to monitor for threats. In lieu of near real-time data, monitoring global data from commercial vendors could provide key indicators and warnings.

- » (U//FOUO) For future health crises, trade data from even a single country can be highly diagnostic. For example, because China produces about 80 percent of the world's supply of surgical face masks, its stockpiling of facemasks indicates a significant health concern.⁹

[REDACTED]

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(U) Alternative Analysis

(U//FOUO) We evaluated three competing hypotheses that explain the sudden shift in China's imports and exports of medical goods in January and found none of them as compelling. These alternatives would be more probable if we learned that private companies—independent of Chinese Government influence or control—accounted for substantial portions of these changes in imports and exports in 2020.

- » (U//FOUO) *The Chinese Government stockpiled medical supplies after notifying the WHO on 20 January about the severity of COVID-19.* This scenario would require the spike in imports to China to have occurred within the 11 remaining days in January, which is unlikely because the medical supply industry has shifted to a "just in time" inventory structure and would probably have had insufficient inventory to fulfill China's large purchases in shorter than average lead times, according to DHS I&A (b) (3) (7) (E).
- » (U//FOUO) *Individuals or private companies responding to the COVID-19 crisis accounted for the changes in the purchase and sale of medical supplies.* This hypothesis seems less plausible because of the magnitude and rapidity of the changes in Chinese imports and exports and because these changes coincided so closely with the COVID-19 outbreak. Further, an official proclamation by the Chinese Government directing its government leaders and Chinese companies to import medical supplies also indicated it was not done solely by private actors.¹¹
- » (U//FOUO) *Market changes accounted for the decrease in exports of medical supplies.* This hypothesis seems unlikely because of the magnitude of changes in early 2020. Although the US market share for Chinese imports of medical supplies has been decreasing since 2017, in part from the implementation of Section 301 trade remedy tariffs, US imports of face masks and gowns from China dropped by twice as much in early 2020 as in all of 2019; imports of hand sanitizers also decreased in early 2020 after increasing in 2019, according to DHS I&A (b) (3) (7) (E).

(U) Tracked by: HSEC-6, HSEC-7

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(U) Source Summary Statement

(U//FOUO) We have **moderate confidence** in our overall judgment that China likely hid the severity of COVID-19 from the international community in early January. **DHS I&A (b) (3) (B)**

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

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Exhibit 6



**Congressional
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COVID-19: China Medical Supply Chains and Broader Trade Issues

Updated December 23, 2020

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R46304



Congressional Research Service
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SUMMARY

R46304

December 23, 2020

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COVID-19: China Medical Supply Chains and Broader Trade Issues

The outbreak of Coronavirus Disease 2019 (COVID-19), first in China, and then globally, including in the United States, has drawn attention to the ways in which the U.S. economy depends on manufacturing and supply chains based in China. This report aims to assess current developments and identify immediate and longer range China trade issues for Congress.

An area of particular concern to Congress has been U.S. shortages in medical supplies—including personal protective equipment (PPE) and pharmaceuticals—as the United States stepped up efforts to contain the COVID-19 pandemic with limited domestic stockpiles and insufficient U.S. industrial capacity. Because of China’s role as a global supplier of PPE, medical devices, antibiotics, and active pharmaceutical ingredients, reduced exports from China led to shortages of critical medical supplies in the United States. Exacerbating the situation, in early February 2020, the Chinese government nationalized control of the production and distribution of medical supplies in China—directing all production for domestic use—and directed the bureaucracy and Chinese industry to secure supplies from the global market. Once past the initial peak of its COVID-19 outbreak, the Chinese government appears to have prioritized certain countries and selectively released some medical supplies for overseas delivery.

Congress has enacted legislation to better understand and address U.S. medical supply chain dependencies, including P.L. 116-136, The Coronavirus Aid, Relief, and Economic Security (CARES) Act, that includes several provisions to

- expand drug shortage reporting requirements;
- require certain drug manufacturers to draw up risk management plans;
- require the U.S. Food and Drug Administration (FDA) to maintain a public list of medical devices that are determined to be in shortage; and
- direct the National Academies of Science, Engineering, and Medicine to conduct a study of pharmaceutical supply chain security.

Other potential considerations for Congress include whether and how to further incentivize additional production of health supplies, diversify production, address other supply chain dependencies (e.g., microelectronics), fill information and data gaps, and promote U.S. leadership on global health and trade issues.

The crisis that emerged for the U.S. economy was defined, in large part, by a collapse of critical supply, as well as a sharp downturn in demand, first in China and now in the United States and globally. As China’s manufacturing sector has recovered, while the United States and other major global markets are still grappling with the COVID-19 pandemic, some fear China could overwhelm overseas markets, as it ramps up export-led growth. China is also seeking to make gains in strategic sectors—such as telecommunications, microelectronics, and semiconductors—in which the government undertook extraordinary measures to sustain research and development and manufacturing during the COVID-19 outbreak in China.

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Overview

The outbreak of Coronavirus Disease 2019 (COVID-19), first in the People's Republic of China (PRC or China), and now globally, including in the United States, has drawn attention to the ways in which the United States and other economies depend on critical manufacturing and global value chains that rely on production based in China. Congress has been particularly concerned about these dependencies and has passed legislation to better understand and address them. An area of particular concern to Congress in the current environment has been U.S. shortages of medical supplies—including personal protective equipment (PPE) and pharmaceuticals—as the United States steps up efforts to contain the COVID-19 pandemic with limited domestic stockpiles and insufficient U.S. industrial capacity. Because of China's role as a global supplier of PPE, medical devices, antibiotics, and active pharmaceutical ingredients (API), reduced exports from China led to shortages of critical medical supplies in the United States.¹

Starting in early February 2020, U.S. health care experts began warning of a likely global spread of COVID-19, and early reports of U.S. medical supply shortages began to emerge. At the same time, the Chinese government nationalized control of the production and distribution of medical supplies in China, directing all production for domestic use.² The Chinese government also directed the national bureaucracy, local governments, and Chinese industry to secure supplies from the global market.³ This effort likely exacerbated medical supply shortages in the United States and other countries, particularly in the absence of domestic emergency measures that might have locked in domestic contracts, facilitated an earlier start to alternative points of production, and restricted exports of key medical supplies. As China's manufacturing sector recovers while the United States and other countries are still grappling with COVID-19, the Chinese government appears to have prioritized certain countries for overseas delivery of medical supplies. Those decisions appear to have been driven, at least in part, by political calculations.⁴

¹ Finbarr Bermingham and Su-Lin Tan, "Coronavirus: China's mask-making juggernaut cranks into gear, sparking fears of over-reliance on world's workshop," *South China Morning Post*, March 12, 2020, <https://www.scmp.com/economy/global-economy/article/3074821/coronavirus-chinas-mask-making-juggernaut-cranks-gear>; U.S. Food and Drug Administration, "Coronavirus (COVID-19) Supply Chain Update," Press release, February 27, 2020, <https://www.fda.gov/news-events/press-announcements/coronavirus-covid-19-supply-chain-update>.

² Zhang Pinghui and Zhou Xin, "Coronavirus: China Shifts Responsibility Over Medical Supplies Amid Mask Shortage, Rising Death Toll," *South China Morning Post*, February 3, 2020, updated on February 14, 2020, <https://www.scmp.com/economy/china-economy/article/3048744/coronavirus-mask-shortage-prompts-beijing-tweak-authority>; Finbarr Bermingham and Su-Lin Tan, "Coronavirus: China's Mask Making Juggernaut Cranks Into Gear, Sparking Fears of Overreliance on World's Workshop," *South China Morning Post*, March 12, 2020, <https://www.scmp.com/economy/global-economy/article/3074821/coronavirus-chinas-mask-making-juggernaut-cranks-gear>; Engen Tham, Cheng Leng, and Zhang Yan, "Exclusive: Unilever, 3M on List of Firms Eligible for China Loans to Ease Coronavirus Crisis—Sources," *Reuters*, February 19, 2020, <https://www.reuters.com/article/us-china-health-lending-exclusive-idUSKBN20D0SQ>; Yang Jian, "GM, Wuling Venture Begins Output of Machines to Make Face Masks," *Automotive News*, February 20, 2020, <https://www.autonews.com/china/gm-wuling-venture-begins-output-machines-make-face-masks>; and Luffy Liu, "700 Tech Companies in China Have Begun Making Masks," *EE Times*, February 13, 2020, <https://www.eetimes.com/700-tech-companies-in-china-have-begun-making-masks/>.

³ "Circular on Further Facilitating the Import and Export of Technology During the Period of Epidemic Prevention and Control," PRC Ministry of Commerce, February 4, 2020, <http://english.mofcom.gov.cn/article/newsrelease/significantnews/202002/20200202934774.shtml>; and "Circular on Actively Expanding Imports to Combat Against Novel Coronavirus Epidemic," PRC Ministry of Commerce, February 6, 2020, <http://english.mofcom.gov.cn/article/newsrelease/significantnews/202002/20200202>.

⁴ Li Yan, "Xi Says China to Send More Medical Experts to Italy," *Xinhua*, March 17, 2020, <http://www.ecns.cn/m/news/politics/2020-03-17/detail-1f3unmih1236562.shtml934157.shtml>, and "'Mask Diplomacy' From Beijing to Change Narrative About COVID-19," *SupChina*, March 23, 2020, <https://supchina.com/2020/03/23/mask-diplomacy->

COVID-19 was identified in China in December 2019 and peaked in late January 2020. In response, China shut down a large part of its economy in an effort to contain the outbreak. A key factor in the sharp economic slowdown in China was the dramatic downturn of both demand and supply after Chinese officials imposed restrictions in the third week of January on movement of people and goods in and out of localities across China. When the COVID-19 outbreak in China eased, the Chinese government's efforts to restart business activities were slow and uneven across sectors and locations. Companies sought to meet new government requirements for virus containment and faced worker and supply shortages as interregional logistics remained somewhat constrained.⁵ Resumption of bilateral trade between the United States and China was uneven due to persistent bottlenecks in inputs, the location of container shipments, and logjams in current shipments. U.S. companies typically maintain anywhere from two to ten weeks of inventory, and transportation time for trans-Pacific container shipments is typically three weeks. With this timeframe in mind, initial shortages that U.S. firms faced of deliveries of microelectronics, auto parts, and health and medical products intensified once inventory was depleted. There were additional shortages in a wide range of imports that transit via container ship (e.g., processed raw materials, intermediate industrial goods, and finished consumer products).

As China's economic activities have resumed, many other countries around the world are still taking an economic hit. Restrictions around the world on the movement of people and business operations have prolonged slowdowns in demand, transportation, and logistics worldwide, further dragging down prospects for global trade recovery. Suppressed global demand will likely further complicate efforts to orchestrate a full rebound in economic activity in China (or the world). In sectors where China maintains excess capacity, such as steel, some fear China could overwhelm overseas markets as it ramps up export-led growth to compensate for the sharp economic downturn in the first quarter of 2020. China's exports increased by over 20% in November 2020, over November 2019, led by exports of PPE, consumer electronics, and other consumer goods.

Congress faces choices that will influence the longer-range U.S. trade trajectory vis-a-vis China. Since the imposition of Section 301 tariffs on U.S. imports from China and China's retaliatory tariffs beginning in 2018, some Members have raised questions about the dependence of U.S. supply chains on China for critical products. There are also concerns some have raised about the potential ramifications of these dependencies, particularly in times of crisis or PRC nationalization of industry. Demand pressures during the COVID-19 pandemic could increase U.S. reliance on certain medical supplies from China (provided that the Chinese government is willing to export these supplies to the United States). At the same time, these pressures have also been incentivizing diversification efforts as governments and firms re-evaluate the risks of basing substantial portions of their supply chains in China.

U.S.-China Trade and the Impact of COVID-19

As the United States' third-largest trading partner in 2019, bilateral trade with China is important to the U.S. economy, and the recent sharp downturn in activity affects a wide range of U.S. industries. Total U.S. trade with the world (the sum of exports and imports of goods and services)

from-beijing-to-change-narrative-about-covid-19/.

⁵ Norihiko Sirouzu and Yilei Sun, "As China's 'Detroit' Reopens, World's Automakers Worry About Disruptions," *Reuters*, March 8, 2020.

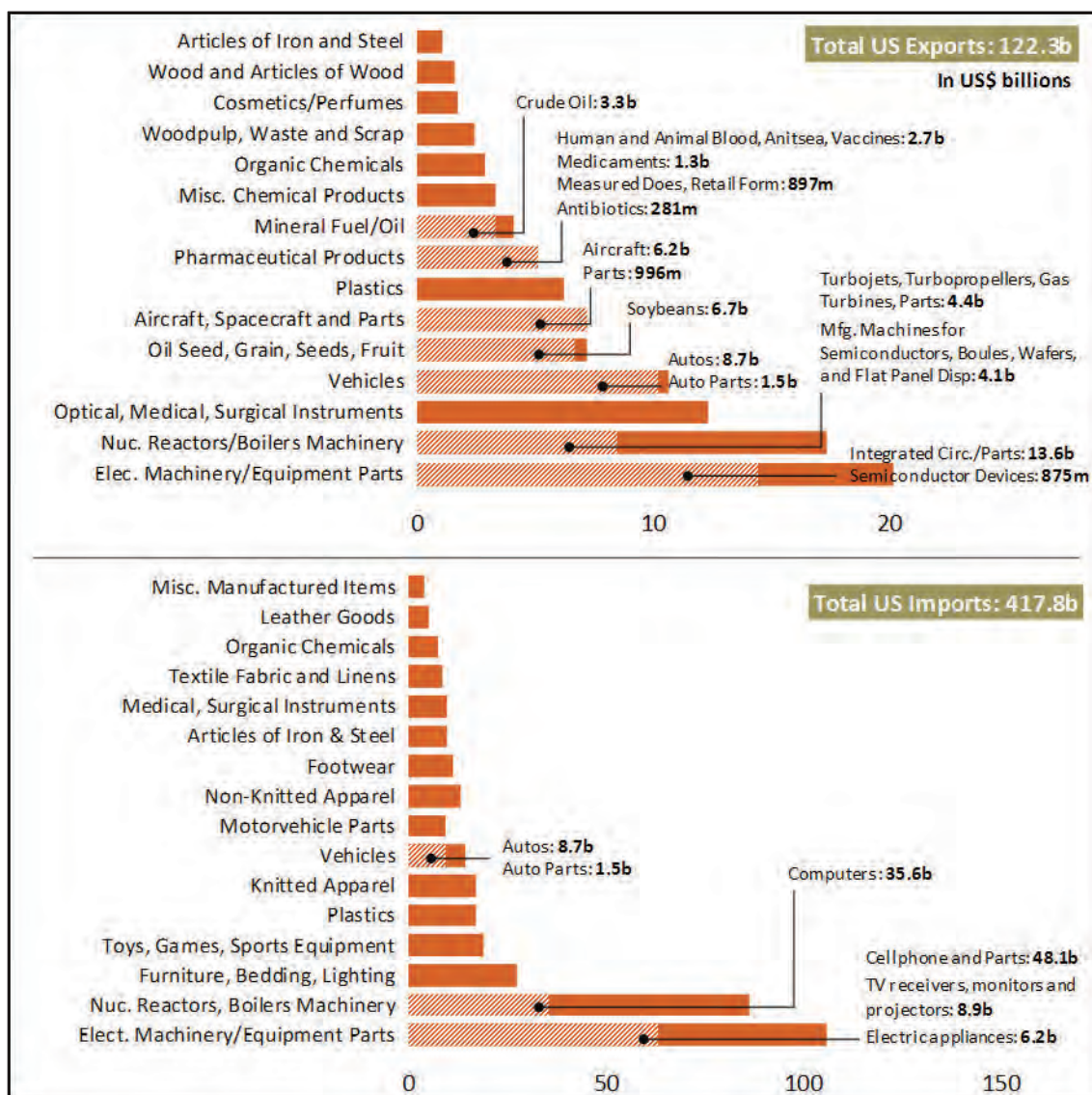
was \$5.6 trillion in 2019, equivalent to 26% of U.S. gross domestic product (GDP); China accounts for 11% of U.S. trade.⁶ Key facts about the relationship include the following:⁷

- China's, total merchandise trade with the United States in 2019 amounted to \$558.9 billion;
- China is the United States' third largest export market for goods. U.S. goods exports to China in 2019 were valued at \$106.6 billion in 2019;
- China is the top source of U.S. imports. U.S. goods imports from China reached \$452.2 billion in 2019;
- U.S. services exports to China in 2019 were valued at \$56.7 billion (mostly travel and transport);
- U.S. services imports from China in 2019 were valued at \$18 billion (about half of this amount was travel and transport);
- U.S. foreign direct investment (FDI) stock in China in 2018 reached \$116.5 billion while China's FDI stock in the United States reached \$60.2 billion in 2018;
- Top U.S. exports to China include semiconductor chips, devices, parts and manufacturing machines; agriculture; aircraft, turbojets, turbo propellers, and gas turbines; optical and medical equipment; autos; plastics; and pharmaceutical products (**Figure 1**); and
- Top U.S. imports from China include microelectronics (computers and cell phones) and appliances, furniture, bedding and lighting; toys, games and sports equipment; plastics; knitted and non-knitted apparel, textile fabric, linens, and footwear; auto parts; articles of iron and steel; medical and surgical instruments; and, organic chemicals (including active pharmaceutical ingredients and antibiotics).

⁶ CRS calculations based on data from the U.S. Department of Commerce, Bureau of Economic Analysis, "Gross Domestic Product, Fourth Quarter and Year 2019 (Second Estimate)," and "U.S. International Trade in Goods and Services, January 2020." Total U.S.-China trade amounted to \$635.3 billion in 2019.

⁷ The following data is sourced from the U.S. Department of Commerce, Bureau of Economic Analysis' International Transactions.

Figure 1. U.S.-China Trade in 2019



Source: Congressional Research Service (CRS) with data from Global Trade Atlas.

Note: Dashed portion of the bar depicts a subset of the product category.

China First Quarter (Q1) 2020 Slowdown Effects on U.S. Industries

Beginning in late January, the outbreak of COVID-19 in China had a direct economic impact on U.S. firms that operate in China, export to or sell goods and services directly in China, or depend on Chinese goods and services for their operations in the United States and abroad. Some analysts estimate that China experienced a sharp drop in economic growth by as much as 9% in Q1 2020 and a 17.2% drop in exports in January-February 2020, compared to the same period in 2019.⁸

⁸ Ryan Woo, Se Young Lee, David Stanway, and Andrew Galbraith, "Goldman Sees China's Economy Shrinking 9 Percent in First Quarter Amid Coronavirus Outbreak," *Reuters*, March 16, 2020, <https://www.reuters.com/article/us-health-coronavirus-china-toll/goldman-sees-chinas-economy-shrinking-9-in-first-quarter-amid-coronavirus-outbreak-idUSKBN21340T>.

China's economy is globally connected through trade, investment, and tourism. The economic slowdown and global spread of COVID-19, combined with global travel and transportation restrictions and other effects, caused worldwide economic fallout. Indicators in key industries, included

- China recorded a sharp downturn in microelectronics production and sales and the United States could experience a similar drop due to a potential gap in availability. ***Almost half the value of U.S. imports from China in 2019 was mobile phones, computers and related parts.***
- Foxconn, a Taiwan firm that produces the iPhone for Apple in China, received formal government permission to reopen its facilities in mid-February, but faced challenges because of quarantine and transportation restrictions. Foxconn said it paid \$1,000 to each returning worker to address potential concerns about returning to work. The company also may have faced supply constraints of key microelectronics inputs.⁹ Other companies that use Foxconn for contract manufacturing in China include Amazon, Cisco, Dell, Google, Hewlett Packard, Nintendo, and Sony, as well as Chinese firms Huawei and Xiaomi.¹⁰
- The U.S. auto industry and manufacturers in South Korea, Japan, and Germany quickly faced manufacturing bottlenecks because of the lack of availability of auto parts supplies from China. The spread of COVID-19 to other major auto manufacturing markets, including the United States, Germany, Japan and South Korea imposed additional constraints on auto manufacturing and sales. ***China exported \$9.6 billion in auto parts to the United States in 2019.***
- U.S. manufacturing faced potential shortages of intermediate inputs for steelmaking and heavy manufacturing, such as refined manganese metal, ferrosilicon, and ferrovanadium. Manganese and ferrovanadium are steel strengtheners that depend on China-based processing. While manganese is mined around the world, China controls 97% of manganese processing. Ferrosilicon is used to extract oxygen from liquid steel, and is mostly produced in China.¹¹ ***China exported almost \$10 billion in iron and steel products to the United States in 2019.***
- U.S. retailers, tourism, and service providers that rely on the Chinese consumer base also took a hit in China. Many closed or significantly curtailed operations. U.S. retailers reduced operating hours or shuttered stores in response to the COVID-19 pandemic.¹² For example, Starbucks closed about half its 4,200 retail outlets in China between late January and late February.¹³ Retailers and tourism service providers around the world have seen significantly reduced revenue as fewer Chinese citizens travel abroad ***China's outbound tourism spending in***

⁹ "Apple Supplier Foxconn Expects Coronavirus-Hit Labor Shortage in China to Ease," *The Wall Street Journal*, March 3, 2020.

¹⁰ Duncan Riley, "Apple and Others May Have Avoided Supply Shortages as some Foxconn Plants Reopen in China," *Silicon Angle*, February 11, 2020.

¹¹ Alistair MacDonald, "Steelmakers Rely Heavily on China," *The Wall Street Journal*, March 6, 2020.

¹² Samantha McDonald, "Columbia, Burberry and 12 Other Fashion Firms Are Closing Stores Due to Coronavirus," *Footwear News*, February 27, 2020.

¹³ Hayley Peterson, "Starbucks Reopens Most Stores in China, Citing 'Early Signs of Recovery,' From Coronavirus," *Business Insider*, February 27, 2020.

*2018 was \$277 billion, of which an estimated \$36 billion was in the United States.*¹⁴

Transportation, Logistics and Broader Considerations

Measures to contain the COVID-19 outbreak significantly curtailed global transportation links, preventing the transport of many products and manufacturing inputs. Passenger air traffic has slowed significantly, taking offline significant air cargo capacity for microelectronics and other products that ship by air. Container shipments also have been constrained by a backlog and dependence on domestic trucking and rail transportation, as well as on the ability of countries to staff port operations.

U.S. airlines started suspending flights to China in late January 2020 and have suspended other routes as COVID-19 has spread globally. United Airlines announced steep flight cuts and said in early March 2020 that ticket bookings were down 70% for Asia-Pacific flights, noting that this downturn was magnified by a surge in flight cancellations. The company noted that revenue in April and May could drop as much as 70%.¹⁵ While Federal Express (FedEx) and United Parcel Service (UPS) announced in early March that they continued to run flights in and out of affected countries, they warned that limitations on travel could delay some shipments, although freight carriers are now starting to repurpose passenger flights for cargo, helping to expand capacity.¹⁶ Quarantine of aircrew and restrictions on the ground in China with regard to labor, production, supply and logistics likely significantly curtailed shipments. On March 26, 2020, the Civil Aviation Administration of China (CAAC) restricted all airlines running passenger flights in and out of China to one flight per week, further constraining air freight capacity.¹⁷ In September 2020, CAAC announced the resumption of direct flights to Beijing from eight countries including Cambodia, Canada, Denmark, Greece, Sweden, and Thailand. Additionally, domestic passenger volumes in China appear to have reached 90% of pre-pandemic levels.¹⁸ Further recovery in air travel could lead to increased air freight capacity for shipments to and from China.¹⁹

Container shipping from China faced serious logjams because of shortages of workers and trucking constraints. These logjams affected both U.S. imports to and exports from China. The Port of Los Angeles announced shipment cuts by 25% that were scheduled from China between February and April 2020. One in nine Southern California jobs is tied to the ports, including people who work on the docks, drive trucks, and move boxes in warehouses, according to the Executive Director of the Port of Los Angeles.²⁰ In March 2020, the Port Authority of New York and New Jersey requested \$1.9 billion in federal aid to offset a forecasted 30% year-on-year drop

¹⁴ United Nations World Tourism Organization, “Exports from International Tourism Hit USD 1.7 Trillion,” June 6, 2019, <https://www.unwto.org/global/press-release/2019-06-06/exports-international-tourism-hit-usd-17-trillion>; U.S. International Trade Administration National Travel and Tourism Office, “Fast Facts: United States Travel and Tourism Industry 2018,” October 2019, https://travel.trade.gov/outreachpages/download_data_table/Fast_Facts_2018.pdf.

¹⁵ Dawn Gilbertson, “Coronavirus Travel Fallout: American, Delta Cutting Flights as Demand Sinks, Joining United and Other,” *USA Today*, March 10, 2020.

¹⁶ “FedEx, UPS Warn of Delivery Delays, JPMorgan Tests Virus Contingency Plan,” *PYMNTS.com*, March 3, 2020.

¹⁷ Ministry of Foreign Affairs of the People’s Republic of China, “CAAC to Further Reduce International Passenger Flights,” press release, March 27, 2020, https://www.fmprc.gov.cn/mfa_eng/topics_665678/kjgzbdffyq/t1762623.shtml.

¹⁸ Reuters, “Cheap seats give Chinese airlines a much-needed bounce,” September 15, 2020.

¹⁹ Reuters, “China will gradually resume direct international flights to Beijing,” September 2, 2020.

²⁰ Margot Roosevelt, “Truckers, Dockworkers Suffer as Coronavirus Chokes L.A., Long Beach Ports Cargo,” *Los Angeles Times*, March 7, 2020.

in cargo volumes, and requested \$3 billion the following July to offset revenue losses stemming from a sharp decline in passenger volumes.²¹

Shipping and logistical constraints slowed U.S. exports to Asia. U.S. exporters of meat, poultry, hay, oranges and other produce reported in March 2020 that refrigerated containers were in short supply and cold storage facilities were overflowing with inventory.²² U.S. and global manufacturing—including production that recently shifted out of China to other parts of Asia and to Mexico—took time to recover from disruptions in Chinese supply. Vietnam, Taiwan, Malaysia, South Korea, Japan, Thailand, and Singapore all have strong supply chain links with China and reported Q1 supply shortages.²³

Even as China's production resumed, these Asian countries grappled with their own COVID-19 outbreaks, further complicating recovery. The situation was exacerbated by spread of COVID-19 in other important manufacturing markets such as South Korea, Italy, Germany, and Mexico. Disruptions in Chinese supply chains were initially expected to have a limited macroeconomic effect on developed markets in the short term, but as the outbreak spread globally and Chinese firms and logistics operations struggled to return to full capacity, a wide range of U.S. imports from China, including raw materials, intermediate industrial inputs, and consumer products faced severe supply constraints. U.S. firms with operations in China or that depend on production in China have begun to consider some diversification away from China and may face further pressure to establish new supply chains. The head of the EU Chamber of Commerce in China said in late February 2020 that the disruption from the COVID-19 pandemic had driven home the need for foreign companies to diversify away from China.²⁴ In April 2020, the Japanese government earmarked \$2.2 billion of a broader economic stimulus package to help companies shift production out of China and to production sites in either Japan or Southeast Asia. In July 2020, Japan's Ministry of Economy, Trade, and Industry announced that 87 firms had agreed to shift production out of China and would receive funding, and in September 2020, added India and Bangladesh to its list of eligible alternative production sites.²⁵ In August 2020, Australia, Japan, and India, announced a collaboration to incentivize companies to diversify supply chains from China for economic and geopolitical reasons.²⁶

Since July 2020, the Chinese government has been reporting instances of the SARS-CoV-2 virus entering China through the packaging of imported frozen seafood and meat from more than 90

²¹ Port Authority of New York and New Jersey, "Port Authority Urgently Calls for Congress to Act on Request for \$3 Billion in Federal Relief Following Precipitous Decline in Passenger Volumes Caused by COVID-19 Pandemic," press release, July 29, 2020; Lee Hong Liang, "Port Authority of New York and New Jersey seeks \$1.9bn bailout amid COVID-19," *Seatrade Maritime News*, March 25, 2020; Port Authority of New York and New Jersey, *Letter to Members of the New York and New Jersey Congressional Delegations*, letter, March 19, 2020, <https://www.politico.com/states/f/?id=00000170-fadd-d9d1-a3f3-fbdd91ed0000>.

²² Jacob Bunge, "Meat Stockpiles Surge as Coronavirus Epidemic Curbs Exports," *The Wall Street Journal*, March 2, 2020.

²³ Trinh Nguyen, "The Economic Fallout of the Coronavirus in Southeast Asia," *Carnegie Endowment for International Peace*, February 13, 2020.

²⁴ "China virus outbreak threatens global drug supplies: European business group," *Reuters*, February 17, 2020.

²⁵ Isabel Reynolds and Emi Urabe, "Japan to Fund Firms to Shift Production Out of China," *Bloomberg*, April 8, 2020; "Japan reveals 87 projects eligible for 'China exit' subsidies," *Nikkei Asian Review*, July 17, 2020.

²⁶ Ministry of Economy, Trade, and Industry of the Government of Japan, "Australia-India-Japan Economic Ministers' Joint Statement on Supply Chain Resilience," September 1, 2020, ; Kiran Sharma, "Japan, India, and Australia aim to steer supply chains around China," *Nikkei Asian Review*, September 1, 2020.

countries.²⁷ The U.S. Centers for Disease Control and Prevention and the World Health Organization have not fully dismissed this possibility, but have indicated that it is extremely unlikely, raising questions about why the Chinese government might be choosing to highlight the issue.²⁸ The Chinese government has sought to demonstrate that it has successfully suppressed the virus in China and may see benefit in publicizing that new COVID-19 outbreaks in China are tied to imports. Chinese state media have covered the COVID-19 risk assessments related to foreign cold chains—a temperature controlled supply chain often used for certain food and pharmaceuticals—in support of a broader narrative that aims to challenge other hypotheses by suggesting instead that the initial COVID-19 outbreak in Wuhan may have been tied to imported seafood. The timing of China’s actions aligns with a new government focus on domestic food security and may aim to improve the government’s control over and ability to moderate imports of seafood and meat.²⁹ China’s new government measures involve ad hoc import restrictions, virtual spot-checks of overseas factories and food suppliers, and ramped up testing and inspection requirements. These measures are slowing imports and raising domestic health concerns about foreign seafood and meat.³⁰

The use of virtual spot checks and corporate interviews and the timing of such measures suggest that the Chinese government also might be using inspections to gain insights into foreign-controlled cold chain storage and distribution expertise and proprietary capabilities in preparation for China’s efforts to expand in this area, including the Chinese government’s plans to distribute Chinese vaccines globally. In December 2020, Alibaba’s logistics arm, Cainiao, announced a partnership with Ethiopian Airlines to operate a global cold chain network out of the Chinese southeastern city of Shenzhen that would be capable of distributing temperature-sensitive medicines globally.³¹

Three Chinese state-tied companies are producing vaccines and negotiating to distribute these vaccines overseas:

1. CanSino Biologics, Inc., a company tied to China’s Academy of Military Medical Science and the Wuhan Institute of Virology³²;
2. Sinovac Biotech, Ltd., a company tied to Beijing University Medical College, the Chinese Academy of Medical Sciences, the National Institute for the Control of Pharmaceutical and Biological Products, and the National Institute for Viral

²⁷ “TIMELINE—China’s Battle with Coronavirus on Frozen Food and Packaging,” Reuters, December 4, 2020, <https://www.reuters.com/article/health-coronavirus-china-food/timeline-chinas-battle-with-coronavirus-on-frozen-food-and-packaging-idUSL1N2IK0K9>.

²⁸ Jon Emont, Phred Dvorak, and Liyan Qi, “China Wants to Screen You for Coronavirus—and Your Frozen Fish,” *The Wall Street Journal*, October 16, 2020, <https://www.wsj.com/articles/china-wants-to-screen-you-for-coronavirusand-your-frozen-fish-11602841654>.

²⁹ See CRS In Focus IF11684, *China’s 14th Five-Year Plan: A First Look*, by Karen M. Sutter and Michael D. Sutherland.

³⁰ Hallie Gu and Dominique Patton, “Steak Out: China’s Coronavirus Testing Chokes Beef Trade,” *Reuters*, November 27, 2020, <https://www.reuters.com/article/us-health-coronavirus-china-beef/steak-out-chinas-coronavirus-testing-chokes-beef-trade-idUSKBN2870JN> and GT Staff Reporters, “Chinese Consumers, Markets, Importers, Wary of Imported Food Amid Surge in COVID-19 Infections,” *Global Times*, November 29, 2020, <https://www.globaltimes.cn/content/1208407.shtml>.

³¹ Rita Liao, “Alibaba and Ethiopian Airlines to Launch Cold Chain Exporting China’s COVID Vaccines,” *TechCrunch*, December 3, 2020, <https://techcrunch.com/2020/12/03/alibaba-ethiopian-airlines-to-ship-covid-vaccines/>.

³² CanSino Biologics, Inc. 2019 Annual Report, <https://www1.hkexnews.hk/listedco/listconews/sehk/2020/0408/2020040800836.pdf>.

- Disease Control and Prevention³³ (the company has been penalized for high profile pharmaceutical corruption cases in the past)³⁴; and
3. China National Biotechnology Group, also known as Sinopharm, a state company that has two different vaccines in development and is also invested in Germany's BioN-Tech through one of its main shareholder's Shanghai Fosun (Fosun Pharma is the co-owner of Sinopharm Industrial Investment, the parent company of Sinopharm).³⁵ Chinese state-tied company, Shanghai Fosun Pharmaceutical (Group) Co., Ltd., (also known as Fosun Pharma) has a strategic alliance with U.S. company Pfizer Inc.'s COVID-19 vaccine German company partner, BioN-Tech. The agreement includes an initial purchase of \$50 million of BioN-Tech's shares with the promise of an additional \$85 million in investment. Fosun has the commercialization rights to BioN-Tech's BNT 162 vaccine in China.³⁶ Chinese media outlet *Caixin* reported in mid-December 2020 that Fosun Pharma will import 7.2 million doses of the Pfizer BioN-Tech vaccine in the first half of 2021.³⁷

Prospects for U.S. Exports

U.S. firms' resumption of exports to China has depended on the resumption of global port operations and China's economic recovery. U.S. export recovery to China has been slow and uneven. As part of the phase one trade deal that the United States and China signed in mid-January 2020 to resolve some issues the United States raised under Section 301, the United States and China agreed, effective February 14, 2020, to cut by 50% the tariffs they imposed in September 2019. China announced a tariff exemption process for 700 tariff lines, including some agriculture, medical supplies, raw materials, and industrial inputs.

With China's recovery, the U.S. government could press China to make up for lost time on U.S. purchases. The COVID-19 pandemic has made it difficult for both sides to meet these targets, however, given the economic fallout in both countries. China's efforts to diversify import sources for key goods—such as energy and agriculture—have potentially undercut China's capacity to meet its U.S. commitments.³⁸ China imported 53.18 million tons of crude oil and replenished its strategic petroleum reserves from non-U.S. sources during the March 2020 collapse in global oil prices.³⁹ The sustained outbreak of African Swine Flu in China has fueled an uptick in China's pork imports from the United States, but overall agricultural purchases remain below previous years and still fall short of negotiated targets. As part of the phase one trade deal, China

³³ Company website at <http://www.sinovac.com/?optionid=454>.

³⁴ Eva Dou, "History of Bribery Hangs Over Chinese Vaccine Company," *The Washington Post*, December 9, 2020.

³⁵ Chris Devonshire-Ellis, "China's COVID-19 Vaccine Development and Availability," China Briefing, Dezan Shira and Associates, December 3, 2020, <https://www.china-briefing.com/news/chinas-covid-19-vaccine-development-and-availability/>.

³⁶ "BioN-Tech Announces Full Year 2019 Financial Results and Corporate Update," March 31, 2020, <https://investors.biontech.de/node/7356/pdf>.

³⁷ Jia Tianqiong and Denise Jia, "Exclusive: Fosun to Import 7.2 Million Doses of BioN-Tech-Pfizer Vaccine," *Caixin*, December 12, 2020, <https://www.caixinglobal.com/2020-12-12/exclusive-fosun-to-import-72-million-doses-of-biontech-pfizer-vaccine-101638506.html>.

³⁸ See CRS In Focus IF11667, *China's Economy in 2020: Navigating Headwinds*, by Karen M. Sutter and Michael D. Sutherland.

³⁹ Clyde Russell, "Column: China's record crude oil, copper imports are more history lesson than predictor," *Reuters*, July 14, 2020.

committed to purchase at least \$200 billion above a 2017 baseline amount of U.S. agriculture (\$32 billion), energy (\$52.4 billion), manufacturing goods (\$77.7 billion), and services (\$37.9 billion) between January 1, 2020 and December 31, 2021.⁴⁰ Regarding agriculture, in November 2019, China's National Development and Reform Commission (NDRC) announced detailed rules for the application and allocation of grain and cotton import tariff-rate quotas for 2020 that specify imports for wheat (9.636 million tons, 90% state-owned trade), corn (7.2 million tons, 60% state-owned trade), rice (5.32 million tons, 50% state trade), and cotton (894,000 tons, 33% state-owned trade).⁴¹ These tariff rate quotas appear to remain unchanged for 2021.⁴² NDRC included in these rules a requirement that companies applying for tariff-rate quotas must have a "positive record" in China's corporate social credit system.⁴³ This requirement allows the Chinese government to restrict or impose terms on certain U.S. cotton exporters. China could use this requirement to create counter pressure in response to recent U.S. congressional and executive branch actions to block U.S. imports of textiles and apparel that contain cotton from China's Xinjiang region due to concerns over forced labor there.⁴⁴ With falling oil prices, China would arguably have to buy a significant larger volume of goods to reach its purchase obligations that are benchmarked by dollar value.

Force Majeure Provisions

The crisis also called into question China's ability to fully implement the U.S.-China phase one trade deal signed in January 2020. The agreement has a *force majeure* provision—which allows parties to opt out of contractual obligations without legal penalty because of developments beyond their control—that could give China flexibility in implementing its commitments.⁴⁵ The deal was finalized in December 2019 and signed in mid-January 2020, when Chinese officials reportedly knew about the severity of the COVID-19 outbreak in Wuhan, which may raise questions about the rationale and timing of the decision to include the *force majeure* provision. A factor further complicating the potential for resumption and expansion of U.S. exports is Chinese companies' invocation of *force majeure* certifications. For example, China National Petroleum Company (CNPC) used the outbreak of COVID-19 to declare *force majeure* in cancelling some liquefied natural gas (LNG) imports, a move followed by a downturn in overall oil and gas demand. The Ministry of Commerce has since provided certifications to Chinese companies that need to declare *force majeure*.⁴⁶ Chinese companies and courts rely on an interpretation of *force*

⁴⁰ Office of the United States Trade Representative, "Economic and Trade Agreement Between the Government of the United States of America and the Government of the People's Republic of China," January 15, 2020.

⁴¹ National Development and Reform Commission of the People's Republic of China, "关于2020年粮食棉花进口关税配额申请和分配细则的公告 2019年第9号 (Announcement Regarding Application and Distribution Rules for Import Tariff Rate Quotas for Grain and Cotton)" September 29, 2019, https://www.ndrc.gov.cn/xxgk/zcfb/gg/201909/t20190930_1181887.html.

⁴² United Nations Food and Agriculture Organisation, "China (mainland) sets 2021 low tariff import quotas," September 18, 2020, <http://www.fao.org/giews/food-prices/food-policies/detail/en/c/1308381/>.

⁴³ CRS In Focus IF11342, *China's Corporate Social Credit System*, by Michael D. Sutherland.

⁴⁴ U.S. Customs and Border Protection, "CBP Issues Detention Order on Cotton Products Made by Xinjiang Production and Construction Corps Using Prison Labor," press release, December 2, 2020, <https://www.cbp.gov/newsroom/national-media-release/cbp-issues-detention-order-cotton-products-made-xinjiang-production>; United States Commission on International Religious Freedom, "USCIRF Welcomes House Passage of Uyghur Forced Labor Prevention Act," press release, September 23, 2020, <https://www.uscifr.gov/news-room/releases-statements/uscifr-welcomes-house-passage-uyghur-forced-labor-prevention-act>.

⁴⁵ Office of the United States Trade Representative, "Economic and Trade Agreement Between the Government of the United States of America and the Government of the People's Republic of China," January 15, 2020, Article 6.2.

⁴⁶ Zhou Xin, "Coronavirus: Doubts Raised Over Whether Chinese Companies Can Use Force Majeure to Counter

majeure that is different from the standard legal interpretation in the United States, which allows both parties to cancel contract terms and revert to a pre-contract baseline. In China, *force majeure* is used to cancel an obligation by the party invoking the provision while the other party may still be obligated to perform and honor contract terms. For example, if a payment is blocked or forgiven by the Chinese government, the other party may still be expected to perform according to the contract terms without the foreign party being reimbursed for any additional costs incurred. Moreover, Chinese courts are unlikely to allow foreign firms to prosecute Chinese firms that do not perform according to their contracts.⁴⁷

U.S. Reliance on China for Health Care and Medical Products

In the midst of the pandemic, Congress has expressed a strong interest in responding to U.S. shortages of medical supplies—including PPE and pharmaceuticals—as the United States steps up efforts to contain and counter the COVID-19 pandemic with limited domestic stockpiles and constraints on U.S. industrial capacity. Because of China’s role as a major U.S. and global supplier of medical PPE, medical devices, antibiotics, and active pharmaceutical ingredients (**Appendix**), reduced exports from China led to shortages of critical medical supplies in the United States.⁴⁸ While some analysts and industry groups have pointed to tariffs as a disincentive to U.S. imports of health and medical products, supply shortages due to the sharp spike in demand, as well as the nationalization and diversion of supply to China, appear to have been stronger drivers. According to China Customs data, in 2019 China exported \$9.8 billion in medical supplies and \$7.4 billion in organic chemicals—a figure that includes active pharmaceutical ingredients and antibiotics—to the United States. While there are no internationally agreed guidelines and standards for classifying these products, U.S. imports of pharmaceuticals, medical equipment and products, and related supplies are estimated to have been approximately \$20.7 billion (or 9.2% of U.S. imports), according to CRS calculations using official U.S. data (See **Figure 2** and **Table 1**). This number likely understates the extent to which the United States relies on China for pharmaceuticals and medical equipment, products, and supplies. Some foreign products may contain Chinese inputs or components, which may or may not have been substantially transformed in other countries. However, they may not always be classified as Chinese in origin when imported into the United States. This is due, in part, to the “substantial transformation” test—used by U.S. Customs and Border Protection (CBP) to determine a product’s country of origin for trade purposes—which some consider to be complex, fact-specific, and subject to interpretation on a case-by-case basis that can be inconsistent and subjective.⁴⁹ Additionally, there have been reported cases of Chinese-origin products being declared as non-Chinese in origin upon their importation into the United States (e.g., firms in

Risks,” *South China Morning Post*, February 25, 2020, <https://www.scmp.com/economy/china-economy/article/3052277/coronavirus-doubts-raised-over-whether-chinese-companies-can>.

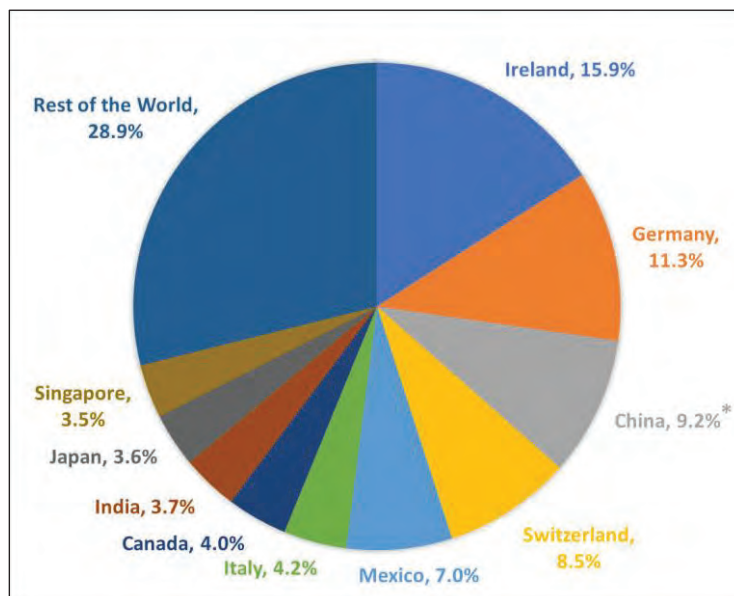
⁴⁷ Dan Harris, “Force Majeure in the Time of Coronavirus,” *China Law Blog*, Harris Bricken, February 27, 2020, <https://www.chinalawblog.com/2020/02/force-majeure-in-the-time-of-coronavirus.html>.

⁴⁸ Finbarr Bermingham and Su-Lin Tan, “Coronavirus: China’s mas-making juggernaut cranks into gear, sparking fears of over-reliance on world’s workshop,” *South China Morning Post*, March 12, 2020, <https://www.scmp.com/economy/global-economy/article/3074821/coronavirus-chinas-mask-making-juggernaut-cranks-gear>; U.S. Food and Drug Administration, “Coronavirus (COVID-19) Supply Chain Update,” Press release, February 27, 2020, <https://www.fda.gov/news-events/press-announcements/coronavirus-covid-19-supply-chain-update>.

⁴⁹ See, for example, 19 FR 141.

other countries importing products from China and relabeling them for export to the United States to avoid tariffs).⁵⁰ This number also likely understates U.S. API imports from China because U.S. direct and indirect imports of API from China may not be classified for such manufacturing use when imported into the United States.

Figure 2. U.S. Imports of Pharmaceuticals and Medical Equipment, Products, and Supplies in 2019



Source: CRS using the World Customs Organization’s “HS Classification Reference for COVID-19 Medical Supplies;” Gary Clyde and Jeffrey J. Schott’s “List of Pharmaceutical and Medical Device Products by Harmonized System (HS) Code” in *Local Content Requirements: A Global Problem*; and Chad Bown’s “Trump’s Trade Policy Is Hampering the U.S. Fight Against COVID-19.” Data sourced from the U.S. International Trade Commission’s DataWeb and Global Trade Atlas.

Notes: The shares presented here cover product categories at the HTS six-digit level. China’s 9.2% share of U.S. imports likely understates the extent to which the United States relies on China for pharmaceuticals and medical equipment, products, and supplies because of how these imports are classified.

Table I. Select U.S. Imports from China in 2019

Value (U.S. Dollars) and Share of U.S. Imports (%)

HTS Number	Description	Value (US\$)	Share of U.S. Imports (%)
30	Pharmaceutical Products	1,560,469,274	1.2
3005.90	Medical Wadding, Gauze, Bandages, and Similar Articles	314,187,928	49.8
3001.90	Heparin and Its Salts	189,703,230	43.1

⁵⁰ See, for example, U.S. Department of Justice, “Importers to Pay more than \$5.2 Million to Resolve Allegations they Evaded Customs Duties in Violation of the False Claims Act,” U.S. Attorney’s Office, Western District of Texas, April 14, 2020; Daniel Ikenson, “Customs fraud is thriving thanks to Trump’s trade war,” The Hill, June 12, 2019; Reuters Staff, “Vietnam to crack down on Chinese goods relabeled to beat U.S. tariffs,” Reuters, June 10, 2019; and Susan Berfield, “The Honey Launderers: Uncovering the Largest Food Fraud in U.S. History,” Bloomberg, September 20, 2013.

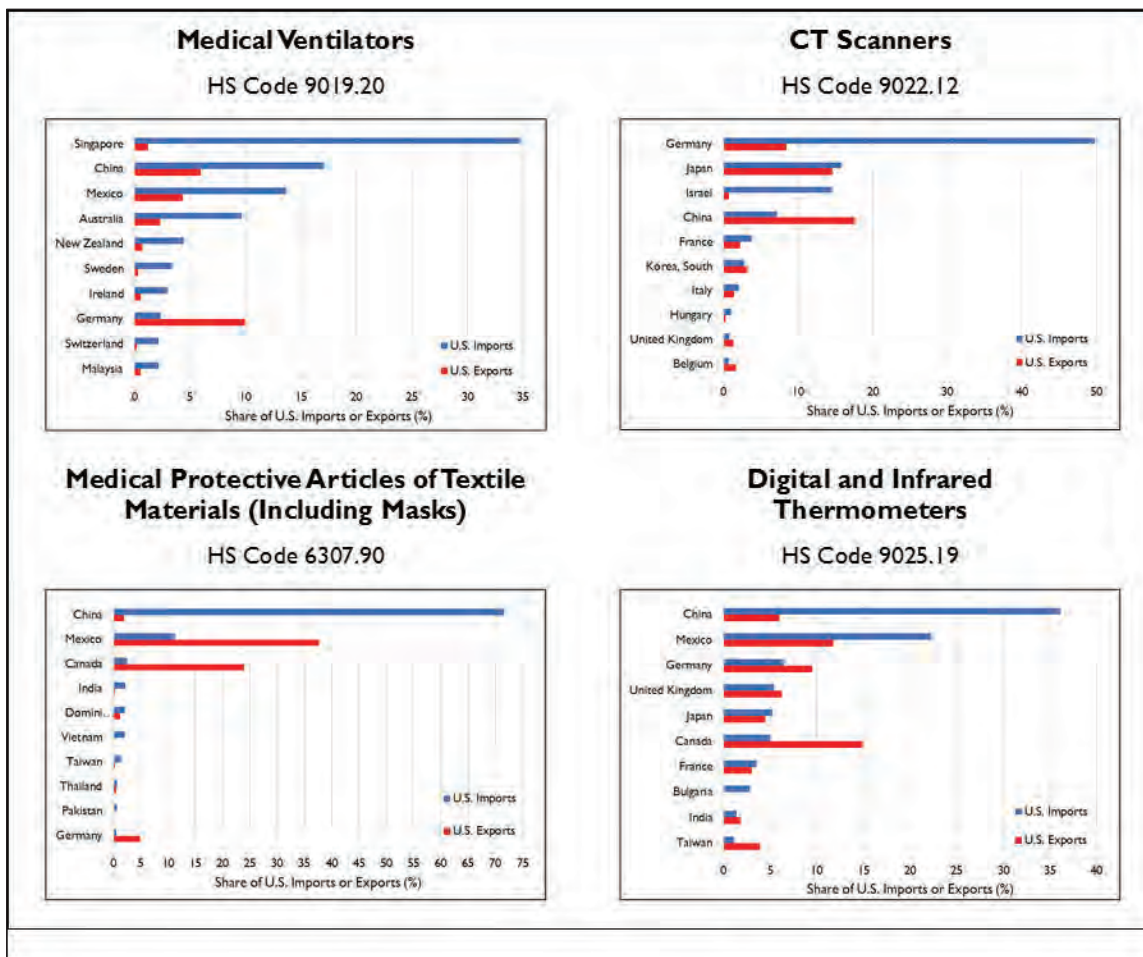
HTS Number	Description	Value (US\$)	Share of U.S. Imports (%)
3005.10	Adhesive Dressing Articles	179,153,921	28.8
3006.50	First-Aid Boxes and Kits	27,482,506	72.4
3006.70	Gel Preparations (Lubricants) for Operations or Physical Exams	7,487,524	20.8
3002.11	Malaria Diagnostic Test Kits	914,555	57.7
2941	Antibiotics	307,137,836	35.9
2941.30	Tetracyclines and Derivatives	93,302,575	90.1
2941.10	Penicillin and Derivatives	59,093,397	51.8
2941.50	Erythromycin and Derivatives	4,659,438	23.5
2941.20	Streptomycins and Derivatives	4,453,931	30.1
2941.40	Chloramphenicol and Derivatives	921,074	93.2
2941.90	Other Antibiotics (NESOI)	144,707,421	24.0
9018	Medical Instruments, Appliances, and Parts (Including Electro-Medical and Sight-Testing)	1,700,501,270	6.2
9018.19	Electro-Diagnostic Equipment and other Apparatus For Functional Exploratory Examination or Checking Physiological Parameters (Including Parts and Accessories)	368,723,243	9.7
9018.31	Syringes (Including Parts and Accessories)	106,902,008	14.4
9018.12	Ultrasonic Scanning Apparatus	78,806,780	19.9
9018.20	Ultraviolet or Infrared Ray Apparatus (Including Parts and Accessories)	11,493,518	14.6
9019	Mechano-Therapy and Respiration Apparatus, Including Parts and Accessories	1,386,955,875	32.5
9019.10.20	Mechano-Therapy Appliances and Massage Apparatus	918,922,381	58.5
9019.20.00	Medical Ventilators and Other Artificial Respiration Equipment	449,688,296	17.0
9019.10.60	Select Psychological Aptitude Testing Equipment	12,155,935	29.8
9019.10.40	Electrical Psychological Aptitude Testing Equipment	6,189,263	57.9
9020	Breathing Appliances and Gas Masks Having Mechanical Parts or Replacement Filters, Including Parts and Accessories	10,002,578	4.0
9020.00.60	Breathing Appliances and Gas Masks	5,448,928	3.1
9020.00.90	Parts and Accessories of Breathing Appliances and Gas Masks	4,124,104	7.2

HTS Number	Description	Value (US\$)	Share of U.S. Imports (%)
9021	Orthopedic and Other Appliances to Compensate for a Defect, Including Parts and Accessories	930,437,769	6.8
9021.10	Orthopedic of Fracture Appliances	323,279,299	13.1
9022	X-Ray Apparatus and Parts	492,398,140	11.0
9022.12	Computed Tomography (CT) Apparatus	49,051,037	7.2

Source: CRS with data from the U.S. International Trade Commission's DataWeb.

While the United States depends on China for low-end PPE and API, the United States depends more on Europe and select Asian countries for high-end medical products. The United States is a global leader in advanced medical equipment and pharmaceutical innovation—areas where China is seeking to gain ground through its industrial policies (**Figure 3**).

Figure 3. U.S. Import and Exports of Select Medical Products in 2019



Source: CRS using data from the U.S. International Trade Commission's DataWeb and Global Trade Atlas.

China Nationalizes Medical Production and Supply

In early February 2020, the Chinese government nationalized control of the production and dissemination of medical supplies in China. Concerned about shortages and its ability to contain COVID-19, the Chinese government transferred authority over the production and distribution of medical supplies from the Ministry of Information Industry and Technology (MIIT) to the NDRC, China's powerful central economic planning ministry. NDRC commandeered medical manufacturing and logistics down to the factory level and directed the production and distribution of all medical-related production, including U.S. companies' production lines in China, for domestic use.⁵¹ In response to government directives, foreign firms with significant production capacity in China, including 3M, Foxconn, and General Motors, shifted significant elements of

⁵¹ Zhang Pinghui and Zhou Xin, "Coronavirus: China Shifts Responsibility Over Medical Supplies Amid Mask Shortage, Rising Death Toll," *South China Morning Post*, February 3, 2020, updated on February 14, 2020, <https://www.scmp.com/economy/china-economy/article/3048744/coronavirus-mask-shortage-prompts-beijing-tweak-authority>.

their operations to manufacturing medical PPE.⁵² By late February 2020, China had ramped up face mask production—both basic surgical masks and N95 masks—from a baseline of 20 million a day to over 100 million a day.

China's nationalization efforts, while understandable as part of its efforts to address an internal health crisis, may have denied the United States and other countries that depend on open and free markets for their health care supply chains timely access to critical medical supplies (See **Table 2** and **Table 3**).⁵³ On February 3, 2020, China's Ministry of Commerce directed its bureaucracy, local governments and industry to secure critical technology, medical supplies, and medical-related raw material inputs from the global market,⁵⁴ a situation that likely further exacerbated supply shortages in the United States and other markets. To ensure sufficient domestic supplies to counter COVID-19, China's Ministry of Commerce (MOFCOM) also called on its regional offices in China and overseas to work with PRC industry associations to prioritize securing supplies from global sources and importing these products. The Ministry of Commerce provided a list of 51 medical suppliers and distributors in 14 countries and regions to target in quickly assuring supply. The Ministry also prioritized food security and the need to increase meat imports.⁵⁵ China's trade data shows that these policies led to steep increases in China's imports of essential PPE and medical supplies, including the raw materials needed to make products such as N95 masks. The policies also contributed to sharp decreases in China's exports of these critical medical products to the world. (See **Table 2**.)

On March 29, 2020, the Australian government imposed new temporary restrictions on all foreign investment proposals in Australia out of concern that strategic investors—particularly those of Chinese origin—might target distressed assets. This came after authorities discovered two

⁵² "Exclusive: Unilever, 3M, on list of firms eligible for China loans to ease coronavirus crisis—sources," *Reuters*, February 13, 2020, <https://www.reuters.com/article/us-china-health-lending-exclusive-idUSKBN20D0SQ>; Yang Jian, "GM, Wuling venture begins output of machines to make face masks," *Automotive News China*, February 20, 2020, <https://www.autonews.com/china/gm-wuling-venture-begins-output-machines-make-face-masks>.

⁵³ Zhang Pinghui and Zhou Xin, "Coronavirus: China Shifts Responsibility Over Medical Supplies Amid Mask Shortage, Rising Death Toll," *South China Morning Post*, February 3, 2020, updated on February 14, 2020, <https://www.scmp.com/economy/china-economy/article/3048744/coronavirus-mask-shortage-prompts-beijing-tweak-authority>; Finbarr Bermingham and Su-Lin Tan, "Coronavirus: China's Mask Making Juggernaut Cranks Into Gear, Sparking Fears of Overreliance on World's Workshop," *South China Morning Post*, March 12, 2020, <https://www.scmp.com/economy/global-economy/article/3074821/coronavirus-chinas-mask-making-juggernaut-cranks-gear>; Engen Tham, Cheng Leng, and Zhang Yan, "Exclusive: Unilever, 3M on List of Firms Eligible for China Loans to Ease Coronavirus Crisis—Sources," *Reuters*, February 19, 2020, <https://www.reuters.com/article/us-china-health-lending-exclusive-idUSKBN20D0SQ>; Yang Jian, "GM, Wuling Venture Begins Output of Machines to Make Face Masks," *Automotive News*, February 20, 2020, <https://www.autonews.com/china/gm-wuling-venture-begins-output-machines-make-face-masks>; and Luffy Liu, "700 Tech Companies in China Have Begun Making Masks," *EE Times*, February 13, 2020, <https://www.eetimes.com/700-tech-companies-in-china-have-begun-making-masks/>.

⁵⁴ Ministry of Commerce of the People's Republic of China, "Circular on Further Facilitating the Import and Export of Technology During the Period of Epidemic Prevention and Control," February 4, 2020, <http://english.mofcom.gov.cn/article/newsrelease/significantnews/202002/20200202934774.shtml>; and Ministry of Commerce of the People's Republic of China, "Circular on Actively Expanding Imports to Combat Against Novel Coronavirus Epidemic," February 6, 2020, <http://english.mofcom.gov.cn/article/newsrelease/significantnews/202002/20200202934157.shtml>.

⁵⁵ Ministry of Commerce of the People's Republic of China, "General Office of the Ministry of Commerce Issued the Circular on Actively Expanding Imports to Combat against Novel Coronavirus Epidemic," press release, February 6, 2020.

instances of Chinese property developers in Australia purchasing large volumes of medical supplies (and precious metals) for shipment to China.⁵⁶ Risland—a wholly owned subsidiary of one of China’s largest property developers, Country Garden Holdings—reportedly shipped 82 tons of medical supplies from Australia to China on February 24, 2020. The shipment included 100,000 medical gowns and 900,000 pairs of gloves.⁵⁷ Greenland Australia—a subsidiary of another large Chinese property developer backed by the Chinese government, Greenland Group—implemented instructions from the Chinese government to secure bulk supplies of medical items from the global market. Greenland reportedly sourced from Australia and other countries, 3 million protective masks, 700,000 hazmat suits, and 500,000 pairs of gloves for export to China over several weeks in January and February 2020.⁵⁸

Table 2. Change in China’s Exports and Imports of Select Medical Products

January-February 2019 vs. January-February 2020

HS Code	Description	World		United States	
		Exports % Change	Imports % Change	Exports % Change	Imports % Change
6210.10	Garments, Made-Up of Fabrics of Felts and Nonwovens (Including Disposable Hospital Gowns and Lab Coats)	-13	40,582	-21	297,288
6307.90*	Made-Up Textile Articles*	-16	2,176	-19	1,615
2939.80	Alkaloids	13	1,019	-18	-
4015.11	Surgical and Medical Gloves	4	210	-8	93
3002.14	Immunological Products	-30	197	121,302	626
3808.94	Disinfectants	46	192	35	155
6210.30	Women’s or Girls’ Protective Garments	-35	188	-48	-75
9004.90	Spectacles and Goggles	-20	185	-12	164
9019.20	Medical Ventilators and Respiration Apparatus	-20	174	-35	209
2936.26	Vitamin B12 and Its Derivatives	-6	113	-21	-33
6506.10	Safety Headgear	-15	106	-19	277
4015.19	Gloves	-13	77	-35	514
8419.20	Medical, Surgical or Laboratory Sterilizers	-34	66	-70	317
3926.20	Gloves, Mittens, and Mitts of Plastics	-15	66	-13	74
9025.19	Thermometers and Pyrometers	-12	65	-16	15

⁵⁶ Phillip Coorey, “China Spree Sparks FIRB Crackdown,” *Financial Review*, March 29, 2020, <https://www.afr.com/politics/federal/china-spree-sparks-firb-crackdown-20200329-p54exo>.

⁵⁷ Kate McKlymont, “Second Developer Flew 82 Tonnes of Medical Supplies to China,” *The Sydney Morning Herald*, March 26, 2020, <https://www.smh.com.au/national/second-developer-flies-82-tonnes-of-medical-supplies-to-china-20200326-p54e8n.html>.

⁵⁸ Kate McKlymont, “Second Developer Flew 82 Tonnes of Medical Supplies to China,” *The Sydney Morning Herald*, March 26, 2020, <https://www.smh.com.au/national/second-developer-flies-82-tonnes-of-medical-supplies-to-china-20200326-p54e8n.html>.

HS Code	Description	World		United States	
		Exports % Change	Imports % Change	Exports % Change	Imports % Change
9020.00	Breathing Appliances and Gas Masks Having Mechanical Parts or Replaceable Filters	-23	34	27	5
3005.90	Wadding, Gauze, Bandage, and Similar Articles for Medical, Surgical Purposes	-12	27	-8	131
3004.20	Medicaments Containing Antibiotics	-11	23	-18	69
4818.90	Bed Sheets and Similar Household or Hospital Articles of Paper	-12	21	-7	-26
6505.00	Hats and Other Headgear of Textile Fabric	-22	16	-24	-8
3702.10	X-Ray Film in Rolls	-43	15	-	50
9022.90	X-Ray Generators, High Tension Generators, Control Panels and Desks, Screens, Examination Or Treatment Tables, Chairs	-11	15	-17	12
3402.20	Surface-Active Preparations, Washing Preparations, and Cleaning Preparations	-18	8	-21	-18
9022.30	X-Ray Tubes	-17	5	115	-6
6116.10	Gloves	-16	-11	-21	-86
2936.27	Vitamin C	-39	-16	-37	-95
9025.11	Thermometers and Pyrometers	-31	-22	-10	299
6216.00	Gloves, Mittens, and Mitts	-27	-22	-30	25
6210.40	Men's Or Boys' Protective Garments	-25	-23	-28	-63
9018.31	Syringes	-21	-28	-50	-18
2847.00	Hydrogen Peroxide	-86	-29	-100	4
2941.10	Penicillin and Derivatives	-24	-34	-17	-
3004.42	Medicaments Containing Pseudoephedrine	-61	-	-	-
3003.60	Medicaments Containing Antimalarial Active Principles	-98	-	-	-

Source: CRS analysis, with data from China Customs and Global Trade Atlas (March 31, 2020).

Notes: *N95 and other protective masks have historically been classified under tariff subheading 6307.99.9889, which includes other miscellaneous textile article made from similar materials.

Table 3. U.S. Imports from China in 2019: COVID-19 Related Medical Supplies

2019 Value (U.S. Dollars), 2019 Share of U.S. Imports (%), and Change from 2018 (%)

Category	Product Description	HS Number	China's Rank	Value (US\$)	Share of U.S. Imports (%)	Change 2019/18 (%)
I. COVID-19 Test Kits/Instruments and Apparatus	COVID-19 test kits (diagnostic reagents based on polymerase chain reaction nucleic acid test)	3822.00	7	212,319,127	5.4	2.7

Category	Product Description	HS Number	China's Rank	Value (US\$)	Share of U.S. Imports (%)	Change 2019/18 (%)
Used in Diagnostic Tests	COVID-19 test kits (diagnostic reagents based on immunological reactions)	3002.15	16	21,754,253	0.1	-59.4
	COVID-19 diagnostic test instruments and apparatus (instruments used in clinical laboratories for In Vitro Diagnosis)	9027.80	3	155,359,874	9.5	-1.4
II. Protective Garments	Face and Eye Protection					
	Textile face-masks, without a replaceable filter or mechanical parts, including surgical masks and disposable face-masks made of non-woven textiles.	6307.90	1	3,171,956,472	71.7	6.5
	Gas masks with mechanical parts or replaceable filters for protection against biological agents. Also includes such masks incorporating eye protection or facial shields.	9020.00	7	10,002,578	4.0	26.3
	Protective spectacles and goggles	9004.90	1	503,787,243	54.8	6.8
	Gloves					
	Plastic gloves	3926.20	1	863,056,388	77.2	-24.3
	Surgical rubber gloves	4015.11	6	1,081,073	0.3	9.6
	Other rubber gloves	4015.19	3	252,443,610	11.0	-5.6
	Knitted or crocheted gloves which have been impregnated or covered with plastics or rubber	6116.10	1	363,733,689	53.6	11.2
	Textile gloves that are not knitted or crocheted	6216.00	1	195,084,793	54.7	1.9
	Other					
	Disposable hair nets	6505.00	1	934,958,363	51.9	-21.3
	Protective garments for surgical/medical use made up of felt or nonwovens	6210.10	1	440,561,626	54.3	-0.7
	Other protective garments of textiles of rubberized textile fabrics or woven fabrics	6210.20	1	27,688,815	64.2	15.4
	Other protective garments of textiles of rubberized textile fabrics or woven fabrics	6210.30	1	55,082,976	55.5	37.3
	Other protective garments of textiles of rubberized textile fabrics or woven fabrics	6210.40	1	323,357,757	44.8	5.0
	Other protective garments of textiles of rubberized textile fabrics or woven fabrics	6210.50	1	202,474,607	45.4	8.8
III. Thermometers	Liquid filled thermometer for direct reading	9025.11	1	15,364,796	81.0	20.6

Category	Product Description	HS Number	China's Rank	Value (US\$)	Share of U.S. Imports (%)	Change 2019/18 (%)
IV. Disinfectants and Sterilization Products	Other thermometers	9025.19	1	217,189,968	36.2	-25.5
	Alcohol solution	2207.10	23	25,420	0.0	154.2
	Alcohol solution	2208.90	2	40,916,542	2.1	-20.5
	Hand sanitizer	3824.99	2	365,615,644	15.3	-16.7
	Hand sanitizer	3402.20	3	39,757,125	7.6	-33.6
	Medical, surgical or laboratory sterilizers	8419.20	13	1,854,603	1.0	22.7
	Hydrogen peroxide	2847.00	15	10,089	0.0	-61.6
	Hydrogen peroxide presented as a medicament	3004.90	15	475,162,117	0.8	19.5
V. Other Medical Devices	Other chemical disinfectants	3808.94	2	8,841,055	10.3	132.5
	Computed tomography (CT) scanners	9022.12	4	49,051,037	7.2	-54.8
	Extracorporeal membrane oxygenation	9018.90	5	758,088,695	5.8	14.6
	Medical ventilators and other oxygen therapy apparatus	9019.20	2	449,688,296	17.0	-2.9
VI. Medical Consumables	Patient monitoring devices	9018.19	4	368,723,243	9.7	-10.1
	Wadding, gauze, bandages, cotton sticks and similar articles	3005.90	1	314,187,928	49.8	10.6
	Syringes, with or without needles	9018.31	2	106,902,008	14.4	6.3
	Tubular metal needles and needles for sutures	9018.32	8	22,465,545	2.9	11.6
	Needles, catheters, cannulae, and the like	9018.39	6	229,655,282	3.7	7.0
	Intubation kits	9018.90	5	758,088,695	5.8	14.6
	Paper bed sheets	4818.90	1	356,642,980	74.9	9.9

Source: CRS using the World Customs Organization's "HS Classification Reference for COVID-19 Medical Supplies" and data from Global Trade Atlas.

Notes: The international Harmonized System (HS) for classifying goods is a six-digit code system, and classification at the eight and ten-digit levels varies by country. The figures presented here may overestimate the actual value of U.S. imports of medical products, as it is not always possible to identify specific, individual products even at the most disaggregated level.

Implications of China's Export Constraints: U.S. Shortages and Policy Response

As the United States ramped up efforts to contain the spread of COVID-19, reduced production and exports of pharmaceuticals and PPE from China exacerbated shortages of critical medical supplies. Minnesota-based 3M, a large-scale manufacturer of N95 respirators, for example, told *The New York Times* in spring 2020 that all masks manufactured at its Shanghai factory were sold to meet China's domestic demand; other mask manufacturers, such as Canada's Medicom, stated

that the Chinese government had not yet authorized them to export PPE.⁵⁹ China's Ministry of Commerce claimed it was not imposing export restrictions on medical supplies,⁶⁰ but this statement may not apply to the situation in which all of China's domestic production was controlled by the government and geared toward domestic consumption.

Subsequently, China's imposition of new export quality checks for PPE, particularly masks—implemented by China's National Medical Products Administration (NMPA)—further slowed exports. On March 30, 2020, China's Ministry of Commerce (MOFCOM) announced new qualifications for medical supply exports.⁶¹ It announced that all medical supplies related to COVID-19 would need to obtain qualifications from China's National Medical Products Administration (NMPA). These new requirements appeared aimed at addressing faulty PPE that several foreign government buyers found in large PPE shipments from China. By requiring new certification processes, the measures also appear to have slowed legitimate exports. Even companies producing in China for export that already had FDA approval had to meet these new PRC requirements.⁶² Related to MOFCOM's announcement, on March 30, 2020, NMPA issued *Regulatory Requirements and Standards for Coronavirus Testing Reagents and Protective Products*. These new requirements regulated COVID-19 testing reagents as Class III medical equipment (highest risk level) and regulated medical-use masks and protective gear as Class II medical equipment, requiring producers to obtain licenses from provincial-level regulators prior to production. The NMPA classified regular masks and protective goggles as Class I medical equipment, requiring producers to file with local authorities. The NMPA also released registration information for seven COVID-19 products (testing kits, ventilators, medical protective wears, medical protective masks, medical surgical masks, single-use masks, and infrared thermometers-detectors).⁶³

In addition to these new registration and inspection requirements, some U.S. legal experts observed that China may have used informal measures, such as administrative guidance, to prioritize exports to certain countries ahead of the United States.⁶⁴ This may have been politically motivated, as China orchestrated publicized PPE deliveries to countries such as Serbia and Italy, which have signed on to China's *One Belt, One Road* initiative and whom China sees as important partners for investment and trade initiatives in Europe.⁶⁵ China organized a range of government-to-government medical supply agreements around the world that sought to emphasize the importance of relations with China and the government's goodwill, but ran into problems with many governments due to faulty PPE. In April and May 2020, Canada's public health authority reported extensive problems with KN95 respirator masks from China that were

⁵⁹ Keith Bradsher and Liz Alderman, "The World Needs Masks. China Makes Them—But Has Been Hoarding Them," *The New York Times*, March 16, 2020, <https://www.nytimes.com/2020/03/13/business/masks-china-coronavirus.html>.

⁶⁰ "China Imposes No Export Ban on Masks: Commerce Official," *Xinhua*, March 5, 2020, http://english.www.gov.cn/statecouncil/ministries/202003/05/content_WS5e60c25dc6d0c201c2cbda0b.html.

⁶¹ State Council of the People's Republic of China, "National Medical Product Administration Announcement No. 5 on the Orderly Export of Medical Products (国家药品监督管理局公告 2020 年第 5 号 关于有序开展医疗物资出口的公告)," March 31, 2020, http://www.gov.cn/zhengce/zhengceku/2020-04/01/content_5497878.htm.

⁶² Kate O'Keefe, Liza Lin, and Eva Xiao, "China's Export Restrictions Strand Medical Goods U.S. Needs to Fight Coronavirus, State Department Says," *The Wall Street Journal*, April 16, 2020.

⁶³ China's National Medical Products Administration, <http://www.nmpa.gov.cn/WS04/CL2590/complete>.

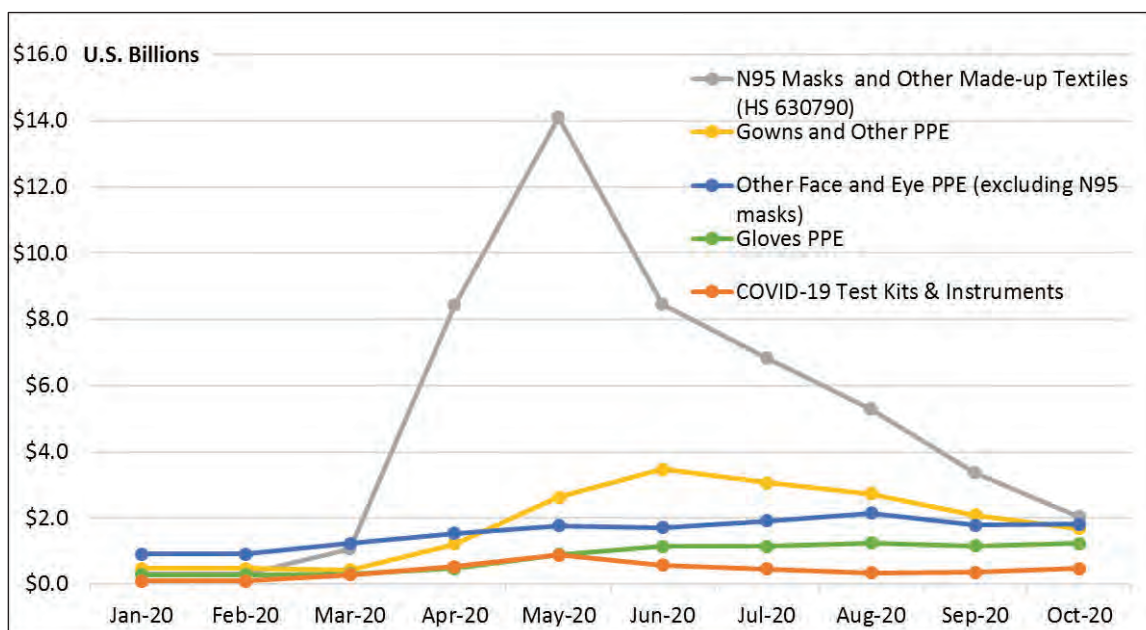
⁶⁴ "Navigating PPE Purchases from China," Webinar with Harris Bricken Law Firm, April 23, 2020.

⁶⁵ Eleanor Albert, "How a Pandemic Drew China and Serbia Closer," *The Diplomat*, March 27, 2020; Xinhua, "Iron-clad China-Serbia friendship stronger in COVID-19 fight," April 2, 2020; Reuters, "China sends medical supplies, experts to help Italy battle coronavirus," March 13, 2020; Alicia Chen and Vanessa Molter, "Mask Diplomacy: Chinese Narratives in the COVID Era," *Stanford Freeman Spogli Institute for International Studies*, June 16, 2020.

counterfeit or otherwise failed to meet federal COVID-19 standards for medical use.⁶⁶ Several European countries, including the Netherlands and Spain, reported faulty masks and COVID-19 test kits.⁶⁷ Chinese propaganda efforts tied to the delivery of PPE were criticized in western media and by European Union officials as trying to capitalize on the crisis to try and divide Europe. Chinese media frequently conflated Chinese government-organized and publicized shipments of PPE that had been procured and paid for by foreign governments as aid.⁶⁸

China's exports of COVID-19-related PPE experienced a sharp uptick between March and June 2020, before tapering off in July with a particularly pronounced increase in N95 masks and other made-up textiles that peaked earlier than other products. China appears to have prioritized Europe in its export of N95 masks, a trend that is reflected both in overall increases and shifts in market share as a percentage of total imports. China's market share as a percentage of EU imports of N95 masks rose by 15 percentage points in March and October 2020, compared to the same period in 2019, while its share of U.S. imports declined by 13 percentage points. (See **Table 4.**) China's market share for N95 masks in Japan, Australia, and South Korea also declined somewhat.

Figure 4. China's Export of Select Covid-19-Related Products: January-October 2020



Source: CRS with data from China Customs. Categories based on 6-digit product codes outlined by the World Customs Organization in "HS Classification Reference for Covid-19 Medical Supplies," ed. 2, as updated April 30, 2020.

Notes: Changes in the value of trade are determined by both the quantity of trade and the price of the good. Many of these products experienced an increase in both price and quantity, during the March-July 2020 period. In defining these product groups, CRS has attempted to capture the most common HS categorizations for these items, however, some trade of these items may have been exported under additional HS codes not reflected

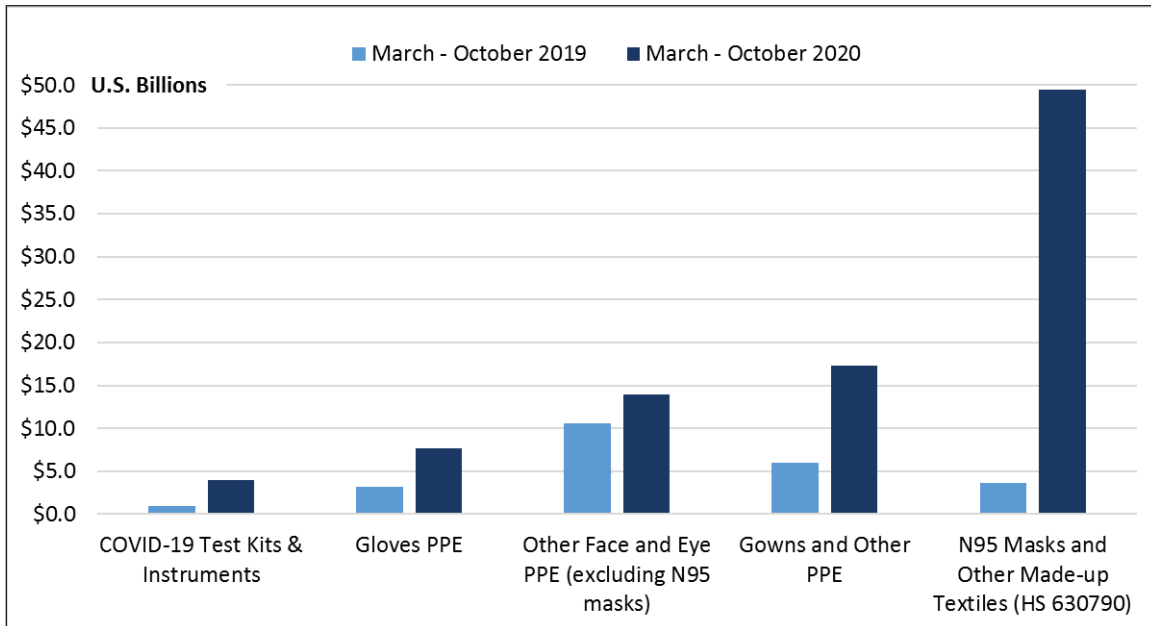
⁶⁶ Jim Bronskill, "Federal Government Rejects 8 Million N95 Masks from a Single Distributor," *The Canadian Press*, May 8, 2020; Evan Dyer, "Canadian-Approved N95 Masks Targeted by Chinese Counterfeiters," *CBC News*, May 14, 2020, and Stephen Chase, "Canada Says One Million Face Masks from China Failed to Meet Federal Standards," *The Globe and Mail*, April 24, 2020.

⁶⁷ Elena Sanchez Nicolas, "EU Fighting Faulty Medical Supplies," *EU Observer*, April 2, 2020.

⁶⁸ Charlie Campbell, "China's 'Mask Diplomacy' is Faltering. But the U.S. Isn't Doing Any Better," *Time*, April 3, 2020, and EU HRVP Josep Borrell, "The Coronavirus Pandemic and the New World it is Creating," Official Website of the European Union, March 24, 2020.

here, and, conversely, the product groups are not exclusive to Covid-19-related gear and may include other similar trade. EU-27 includes the 27 member states of the European Union, excluding the United Kingdom. U.A.E. is the United Arab Emirates.

Figure 5. China's Exports of Select Covid-19-Related Products:
Comparison of March-October 2019 and March-October 2020



Source: CRS with data from China Customs. Categories based on 6-digit product codes outlined by the World Customs Organization in “HS Classification Reference for Covid-19 Medical Supplies,” ed. 2, as updated April 30, 2020.

Notes: Changes in the value of trade are determined by both the quantity of trade and the price of the good. Many of these products experienced an increase in both price and quantity, during the 2020 period. For definitions of the product categories and other caveats, see the notes of **Table 4**.

Table 4. Top Partners: Value of China's Exports of Select Covid-19-Related Medical Goods

Comparison of the March-October 2019 and March-October 2020

Top Partners	USD, Millions		% Change	Market Share (%)	
	Mar.-Oct. 2019	Mar.-Oct. 2020	Mar.-Oct. 2019	Mar.-Oct. 2019	Mar.-Oct. 2020
	2019	2020	2019	2019	2020
N95 Respirator Masks and Other Made-Up Textiles (HS 630790)^a					
EU-27	\$644.2	\$16,020.4	2,386.8%	17.5%	32.4%
United States	\$1,504.3	\$13,726.6	812.5%	40.8%	27.7%
United Kingdom	\$175.5	\$3,868.3	2,104.7%	4.8%	7.8%
Japan	\$348.0	\$3,732.2	972.6%	9.4%	7.5%
Canada	\$98.6	\$1,638.9	1,562.0%	2.7%	3.3%
Australia	\$94.5	\$805.3	751.8%	2.6%	1.6%
Russia	\$29.1	\$719.0	2,374.4%	0.8%	1.5%

Top Partners	USD, Millions		% Change	Market Share (%)	
	Mar.-Oct. 2019	Mar.-Oct. 2020	Mar.-Oct. 2019	Mar.-Oct. 2019	Mar.-Oct. 2020
Singapore	\$22.6	\$714.8	3,059.7%	0.6%	1.4%
South Korea	\$104.7	\$704.5	573.1%	2.8%	1.4%
Mexico	\$30.3	\$496.2	1,536.9%	0.8%	1.0%
All Other	\$633.5	\$7,092.5	1,019.7%	17.2%	14.3%
World	\$3,685.2	\$49,518.8	1,243.7%	100.0%	100.0%

Other Face and Eye Personal Protection Equipment (excluding N95 masks)^b

United States	\$2,828.6	\$3,573.0	26.3%	26.8%	25.7%
EU-27	\$1,697.8	\$1,965.0	15.7%	16.1%	14.1%
United Kingdom	\$404.5	\$1,043.4	158.0%	3.8%	7.5%
Japan	\$695.7	\$846.0	21.6%	6.6%	6.1%
Hong Kong	\$707.4	\$578.4	-18.2%	6.7%	4.2%
Australia	\$250.8	\$470.3	87.5%	2.4%	3.4%
South Korea	\$288.3	\$417.1	44.7%	2.7%	3.0%
Vietnam	\$279.8	\$415.0	48.3%	2.7%	3.0%
Singapore	\$215.8	\$378.3	75.3%	2.0%	2.7%
Canada	\$277.3	\$351.9	26.9%	2.6%	2.5%
All Other	\$2,912.6	\$3,881.9	33.3%	27.6%	27.9%
World	\$10,558.5	\$13,920.4	31.8%	100.0%	100.0%

Gowns and Other Personal Protection Garments^c

United States	\$1,071.4	\$2,955.3	175.8%	30.0%	27.4%
EU-27	\$962.9	\$2,773.6	188.0%	26.9%	25.7%
United Kingdom	\$168.3	\$1,120.5	565.7%	4.7%	10.4%
Canada	\$113.0	\$593.9	425.6%	3.2%	5.5%
Japan	\$215.9	\$550.3	154.9%	6.0%	5.1%
Russia	\$94.3	\$511.5	442.7%	2.6%	4.7%
Australia	\$79.1	\$264.0	233.6%	2.2%	2.4%
Philippines	\$17.2	\$139.4	709.7%	0.5%	1.3%
United Arab Emirates	\$21.4	\$124.9	482.9%	0.6%	1.2%
Saudi Arabia	\$42.9	\$107.8	151.2%	1.2%	1.0%
All Other	\$787.9	\$1,657.7	110.4%	22.0%	15.4%
World	\$3,574.5	\$10,798.9	202.1%	100.0%	100.0%

Gloves: Personal Protection Equipment^d

United States	\$1,025.8	\$2,638.9	157.3%	32.0%	34.6%
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	USD, Millions		% Change	Market Share (%)	
Top Partners	Mar.-Oct. 2019	Mar.-Oct. 2020	Mar.-Oct. 2019	Mar.-Oct. 2019	Mar.-Oct. 2020
EU-27	\$681.1	\$1,495.8	119.6%	21.3%	19.6%
United Kingdom	\$116.0	\$928.7	700.4%	3.6%	12.2%
Japan	\$277.7	\$626.7	125.7%	8.7%	8.2%
Canada	\$104.4	\$420.9	303.2%	3.3%	5.5%
Russia	\$67.4	\$165.1	144.8%	2.1%	2.2%
Australia	\$54.3	\$132.5	144.1%	1.7%	1.7%
United Arab Emirates	\$37.2	\$93.2	150.2%	1.2%	1.2%
Brazil	\$68.1	\$82.7	21.5%	2.1%	1.1%
South Korea	\$62.6	\$73.1	16.9%	2.0%	1.0%
All Other	\$706.8	\$961.4	36.0%	22.1%	12.6%
World	\$3,201.4	\$7,619.0	138.0%	100.0%	100.0%

Covid-19 Test Kits and Instruments^a

EU-27	\$198.3	\$876.4	342.0%	22.3%	22.3%
United States	\$201.0	\$579.2	188.2%	22.6%	14.8%
Hong Kong	\$112.1	\$497.4	343.8%	12.6%	12.7%
Brazil	\$12.9	\$193.5	1,394.5%	1.5%	4.9%
United Kingdom	\$12.4	\$175.1	1,310.6%	1.4%	4.5%
Indonesia	\$14.9	\$130.3	772.6%	1.7%	3.3%
Philippines	\$7.3	\$117.4	1,500.5%	0.8%	3.0%
Russia	\$9.5	\$99.7	952.1%	1.1%	2.5%
Singapore	\$19.0	\$77.7	309.0%	2.1%	2.0%
India	\$44.4	\$73.6	65.7%	5.0%	1.9%
All Other	\$255.8	\$1,108.0	333.2%	28.8%	28.2%
World	\$887.6	\$3,928.2	342.6%	100.0%	100.0%

Source: China Customs (downloaded via Trade Data Monitor). Categories based on the 6-digit product codes outlined by the World Customs Organization in “HS Classification Reference for Covid-19 Medical Supplies,” ed. 2, as updated April 30, 2020.

Notes: Changes in the value of trade are determined by both the quantity of trade and the price of the good. Many of these products experienced an increase in both price and quantity, during the March-July 2020 period. In defining these product groups, CRS has attempted to capture the most common HS categorizations for these items, however some trade of these items may have been exported under additional HS codes not reflected here, and, conversely, the product groups are not exclusive to Covid-19-related gear and may include other similar trade. See footnotes for specific product classifications.

EU-27 includes the 27 member states of the European Union, *excluding* the United Kingdom. U.A.E. is the United Arab Emirates.

- a. HS 630790 is a higher-level classification that includes N95 masks among other types of “Made-Up Textile Articles [not classified elsewhere].”

- b. Other Face and Eye PPE is defined as HS 392690, 481890, 900490, and 902000.
- c. Gowns and Other PPE are defined as HS 392620, 401590, 481850, 621010, 621040, 621050, and 650500.
- d. PPE Gloves are defined as HS 392620, 401511, 401519, 611610, and 621600.
- e. Covid-19 Test Kits and Instructions are defined as HS 300215, 382100, 382200, and 902780.

U.S. Shortages

U.S. national and state-level health authorities began reporting shortages of medical supplies—including PPE such as gowns and face masks—in February 2020. On March 18, 2020, President Trump issued Executive Order 13909, *Prioritizing and Allocating Health and Medical Resources to Respond to the Spread of COVID-19*, which announced the President’s invocation of the Defense Production Act of 1950 (DPA) in response to the COVID-19 pandemic.⁶⁹ The DPA confers broad presidential authorities to mobilize domestic industry in service of the national defense, defined in statute as various military activities and “homeland security, stockpiling, space, and any directly related activity” (50 U.S.C. §4552), including emergency preparedness activities under the Stafford Act, which has been used for public health emergencies.⁷⁰ Among other authorities, Title I of the DPA allows the President to require persons (including businesses and corporations) to (1) prioritize and accept government contracts for materials and services, and (2) allocate or control the general distribution of materials, services, and facilities as necessary to promote the national defense. The Administration, however, is only publicly providing limited direction to the private sector under this authority.⁷¹

The use of the DPA to respond to the COVID-19 pandemic required some amount of time to produce adequate supplies, considering the large volumes of products, particularly PPE and ventilators, which were in urgent demand. Many U.S. firms are typically hesitant to invest in substantial increases in production, including obtaining the capital equipment and other inputs required, until they have a guaranteed buyer and price.⁷² Manufacturing firms, such as General Motors, Ford Motor Company, and Tesla repurposed factory production for ventilators, but, as defense logistics experts projected, these types of efforts took months.⁷³ Additionally, in the United States, PPE and ventilators for use in the health care setting are considered medical devices and require marketing permission from the U.S. Food and Drug Administration (FDA).⁷⁴

⁶⁹ Executive Order 13909 “Prioritizing and Allocating Health and Medical Resources to Respond to the Spread of COVID-19,” 85 *Federal Register* 56, March 23, 2020, <https://www.govinfo.gov/content/pkg/FR-2020-03-23/pdf/2020-06161.pdf>; CRS Report R43767, *The Defense Production Act of 1950: History, Authorities, and Considerations for Congress*, by Michael H. Cecire and Heidi M. Peters; CRS Insight IN11231, *The Defense Production Act (DPA) and COVID-19: Key Authorities and Policy Considerations*, by Michael H. Cecire and Heidi M. Peters; CRS Insight IN11280, *COVID-19: Industrial Mobilization and Defense Production Act (DPA) Implementation*, by Michael H. Cecire and Heidi M. Peters.

⁷⁰ CRS Insight IN11231, *The Defense Production Act (DPA) and COVID-19: Key Authorities and Policy Considerations*, by Michael H. Cecire and Heidi M. Peters

⁷¹ The White House, “Remarks by President Trump, Vice President Pence, and Members of the Coronavirus Task Force in Press Briefing,” March 22, 2020, <https://www.whitehouse.gov/briefings-statements/remarks-president-trump-vice-president-pence-members-coronavirus-task-force-press-briefing-8/>.

⁷² Lena H. Sun and Rachel Siegel, “As Demand Spikes for Medical Equipment, This Texas Manufacturer is Caught in the Coronavirus Supply Chain Panic,” *The Washington Post*, February 15, 2020, <https://www.washingtonpost.com/business/2020/02/15/coronavirus-mask-shortage-texas-manufacturing/>.

⁷³ Aaron Gregg, Dan Lamothe, and Christian Davenport, “Having Automakers Churn Out Ventilators Won’t be Quick or Easy, Experts Say,” *The Washington Post*, March 21, 2020.

⁷⁴ Also see CRS In Focus IF11488, *Personal Protective Equipment (PPE) and COVID-19: FDA Regulation and Related Activities*, by Agata Bodie and Victoria R. Green.

The Trump Administration's relatively late formal invocation and activation of the DPA, which could have effectively served as an export constraint on U.S.-produced medical supplies, arguably left discretion to U.S. companies to decide whether to fill export or domestic orders first. By contrast, governments in Taiwan, Thailand, France, and Germany boosted production but restricted exports, further curtailing U.S. supply options. In January and February 2020, organizers of U.S. private sector relief efforts reportedly purchased large amounts of U.S. PPE products for airlift to China, further depleting U.S. supplies.⁷⁵

Some Members of Congress have called for broader tariff relief or at least new exclusions for existing tariffs and a moratorium on any new tariffs. Other Members and U.S. domestic producers argue that such liberalization could open the U.S. market to a flood of imports during an economic downturn.⁷⁶ The Office of the United States Trade Representative (USTR) announced on March 6, 2020, that it would lift tariffs imposed under Section 301 authorities on 19 specific products and 8 10-digit subheadings of medical supply and equipment items from China (See **Table 5**).⁷⁷

The USTR announced on March 20, 2020, that, prior to the COVID-19 outbreak, the agency had been working with the U.S. Department of Health and Human Services "to ensure that critical medicines and other essential medical products were not subject to additional Section 301 tariffs." Consequently, the United States had not imposed tariffs on certain critical products, such as ventilators, oxygen masks, and nebulizers. The USTR indicated that it had prioritized the review of requests for exclusions on medical care products, resulting in exclusions granted on basic medical supplies, including gloves, soaps, facemasks, surgical drapes, and hospital gowns.

Since March 2020, the USTR has exempted certain medical products from Section 301 tariffs in several rounds of exclusions. CRS could not determine exactly how many of them have been exempted on the basis of COVID-19 concerns, as the USTR does not specify the rationale for granting exclusions in its announcements. While CRS can identify some products, there are

⁷⁵ U.S. Embassy & Consulates in China, "The United States Announces Assistance to the COVID-19," *U.S. Department of State*, press release, February 7, 2020, <https://china.usembassy-china.org.cn/the-united-states-announces-assistance-to-the-novel-coronavirus/>; UPS Foundation, "UPS to Airlift More Than 2 Million Masks and Protective Gear To China," *UPS Pressroom*, press release, January 31, 2020, https://pressroom.ups.com/pressroom/ContentDetailsViewer.page?ConceptType=PressReleases&id=1580479415168-269&WT.mc_id=UPSCOM_NEWSANDINFO_CORONA_PRESSRELEASE_013120; Direct Relief, "Direct Relief Rushes Facial Masks to China to Fight Coronavirus Spread," press release, January 28, 2020, <https://www.directrelief.org/2020/01/direct-relief-rushes-facial-masks-to-china-to-fight-coronavirus-spread/>; Tad Walch, "Inside the church's donation of masks, coveralls and goggles to China over the coronavirus outbreak," *Deseret News*, January 29, 2020, <https://www.deseret.com/faith/2020/1/29/21113386/coronavirus-china-outbreak-lds-church-mormon-russell-nelson-donation-chinese-health-wuhan>.

⁷⁶ William Mauldin, "U.S. to Allow Some Delays in Tariff Payments," *The Washington Post*, March 26, 2020.

⁷⁷ "Notice of Product Exclusions: China's Acts, Policies and Practices Related to Technology Transfer, Intellectual Property, and Innovation," USTR Notice, U.S. Federal Register, March 10, 2020, <https://www.federalregister.gov/documents/2020/03/10/2020-05000/notice-of-product-exclusions-chinas-acts-policies-and-practices-related-to-technology-transfer>. Also see <https://www.govinfo.gov/content/pkg/FR-2020-03-10/pdf/2020-05000.pdf> and https://ustr.gov/sites/default/files/enforcement/301Investigations/%24300_Billion_Exclusions_Granted_March_2020.pdf.

others with known or potential medical uses—or inputs for the manufacture thereof—that have received exclusions but whose ultimate purpose cannot always be ascertained from HTSUS subheadings or the provided product descriptions (e.g., organic chemicals or textiles for the manufacture of pharmaceuticals or PPE).

In addition, at the end of March 2020, the USTR published a *Federal Register* notice seeking comments to determine if further modifications to the Section 301 tariffs on U.S. imports from China are necessary to respond to the COVID-19 pandemic in the United States. The notice provided no further guidance on the types of products that the USTR considers to be “medical-care products.” The review of comments was to run parallel to, and was not to affect, any ongoing product exclusion requests still under review. The USTR has not indicated what form the response would take or when it will respond to comments—only that it will review them on a rolling basis. These comments may already be informing product exclusion decisions, or may lead to the establishment of a new formal exclusion process, akin to that used for Lists 3 and 4, but strictly for medical products.

The Administration appears reluctant to liberalize non-health-related tariffs, preferring to delay tariff payments instead.⁷⁸ In late March 2020, the U.S. Customs and Border Protection sent notices to companies saying that officials will approve some delays in tariff payments to offer economic relief due to the severity of COVID-19; they may also be weighing a broader suspension of collecting duties.⁷⁹ Separate from COVID-19, with regard to existing tariff exemptions, on March 20, USTR invited industry to submit public comments beginning on April 20, regarding whether USTR should extend certain tariff exclusions on other products already granted in June 2019 that expire in June 2020.⁸⁰ USTR undertook selective liberalization but broader liberalization of U.S. tariffs on Chinese goods during the COVID-19 outbreak, could expose the U.S. economy to Chinese excess industrial capacity at a point of economic downturn in the United States. Chinese firms also could capture market share and gain a unique foothold in the U.S. market through market softening and if the United States were to relax FDA and other product certifications.

Table 5. Select Section 301 Tariff Exclusions on Select U.S. Imports from China

Value (U.S. Dollars) and Share of U.S. Imports (%) in 2019

HTS Number	Description	Value of Total U.S. Imports (US\$)	Value of U.S. Imports from China (US\$)	China's Share of Total U.S. Imports (%)
3401.19.0000	Soap and Organic Surface-Active Products	164,333,744	106,484,402	64.8
3926.90.9910*	Laboratory Ware	485,245,133	86,823,074	17.9
4015.19.0510	Nitrile and Sterile Gloves	147,518,639	12,889,989	8.7

⁷⁸ Robert E. Lighthizer, “Lighthizer Responds: Medical Trade Tariffs,” Letter to the Editor, *The Wall Street Journal*, March 21-22, 2020.

⁷⁹ Alex Leary and William Mauldin, “Import Tariffs Will be Halted, Officials Say,” *The Wall Street Journal*, March 28-29, 2020.

⁸⁰ “Request for Comments Concerning the Extension of Particular Extensions Granted Under the June 2019 Product Exclusion Notice From the \$34 Billion Action Pursuant to Section 301: China’s Acts, Policies and Practices Related to Technology Transfer, Intellectual Property and Innovation,” USTR Notice, U.S. Federal Register, March 20, 2020, <https://www.federalregister.gov/documents/2020/03/20/2020-05890/request-for-comments-concerning-the-extension-of-particular-exclusions-granted-under-the-june-2019>.

HTS Number	Description	Value of Total U.S. Imports (US\$)	Value of U.S. Imports from China (US\$)	China's Share of Total U.S. Imports (%)
4015.19.0550	Nitrile and Sterile Gloves	1,363,144,838	200,159,326	14.7
4818.90.0000	Disposable (Paper) Household, Sanitary, or Hospital Bed Articles	476,012,068	356,642,980	74.9
6210.10.5000	Personal Protective Equipment	795,151,929	426,658,153	53.7
6307.90.6090	Medical Protective Clothing	11,786,110	5,502,995	46.7
6307.90.6800	Medical Protective Clothing	445,250,763	159,699,946	35.9
6307.90.9889*	Personal Protective Equipment	3,209,428,978	2,307,838,576	71.9
9004.90.0000*	Protective Goggles	919,198,348	503,787,243	54.8

Source: CRS using information from the Office of the U.S. Trade Representative (85 FR 13970 and 85 FR 15244) and data from the U.S. International Trade Commission's DataWeb.

Notes: *Only a portion of the HTS ten-digit subheading is covered by the tariff exclusion. For more detail, see 85 FR 15244. N95 and other protective masks have historically been classified under tariff subheading 6307.99.9889, which includes other miscellaneous textile article made from similar materials.

In an effort to quickly bring overseas medical supplies into the United States, the Federal Emergency Management Agency (FEMA) announced on March 29, 2020 that it was arranging an airlift for 22 flights, most from Asia, over the subsequent two weeks. The airlift was for medical supplies that medical distributors already planned to import into the United States, but it accelerated their delivery arrival time by shipping by air instead of ocean freight.⁸¹ As of May 2020, FEMA said it had coordinated the delivery of more than 97 million respirators, 133.7 million surgical masks, and 10,600 ventilators, among other critical medical supplies.⁸²

The trade disruptions due to the COVID-19 pandemic highlighted U.S. and broader global dependence on bulk API from China. In addition to medical supplies specific to COVID-19, the disruption of China's pharmaceutical and medical exports showed the potential impact of China API trade on availability and pricing for common drugs and components for medical devices. According to FDA officials, in 2018, China ranked second among countries that export drugs and biologics to the United States by import line (accounting for 13.4% of U.S. imports of those products).⁸³ However, FDA states it is not able to determine the volume of APIs that China is manufacturing, given the complexity of the supply chain and gaps in what pharmaceutical companies are required to disclose about their inputs.⁸⁴ China is also a leading supplier of APIs in

⁸¹ Jonathan Swan and Joann Muller, "Inside the Start of the Great Virus Airlift," *Axios*, March 29, 2020, https://www.axios.com/coronavirus-airlift-masks-medical-supplies-1d1913bf-744e-41cf-895c-d8934afa2c36.html?utm_source=newsletter&utm_medium=email&utm_campaign=newsletter_axiosneakpeek&stream=top.

⁸² Federal Emergency Management Agency, "FEMA Releases State-by-State PPE Data," press release, May 14, 2020.

⁸³ Testimony of FDA Associate Commissioner for Global Policy and Strategy Mark Abdoo, in U.S. China Security and Economic Review Commission, *Exploring the Growing Reliance on China's Biotech and Pharmaceutical Products*, July 31, 2019, <https://www.fda.gov/news-events/congressional-testimony/exploring-growing-us-reliance-chinas-biotech-and-pharmaceutical-products-07312019>. Information provided by FDA's Office of Legislation through personal communication with CRS. FDA's usage of the term "import line" refers to a distinct regulated product within a shipment through customs.

⁸⁴ FDA, Testimony of Dr. Janet Woodcock, Director the Center for Drug Evaluation and Research, "Securing the U.S. Drug Supply Chain: Oversight of FDA's Foreign Inspection Program," December 10, 2019. Also see CRS Report

global supply chains for painkillers, diabetes medicines, and antibiotics, meaning a slowdown in API exports from China could increase cost pressures faced by U.S. drug manufacturers.⁸⁵ For example, China accounts for 52% of U.S. imports of penicillin, 90% of tetracycline, and 93% of chloramphenicol.⁸⁶ On February 27, 2020, FDA Commissioner Stephen Hahn announced that a manufacturer of an unspecified human drug informed FDA of a shortage the drug's supply related to a Chinese API manufacturer affected by COVID-19.⁸⁷ Because information disclosed to FDA regarding drug shortages is considered proprietary, FDA did not disclose the name of the drug in question, but did note that alternatives exist for patient use.⁸⁸ According to congressional testimony delivered in October 2019 by Janet Woodcock, director of the FDA's Center for Drug Evaluation and Research, the FDA is unable to estimate the total volume of all API produced in China. Woodcock also stated in her testimony that the FDA was able to identify three drugs on the WHO's Essential Medicines list whose API manufacturers are based only in China: capreomycin and streptomycin, commonly used to treat tuberculosis, and sulfadiazine, used to treat chancroid and trachoma.⁸⁹

China exported 10 million tons of bulk API in 2019, a 9% increase over 2018, according to the China Chamber of Commerce for the Import and Export of Medicine and Health Products. Almost 90% of China's API exports **by volume** went to Asia, Europe, and North America, including the United States (7%), Europe (20%), India (8%), Southeast Asia (41%), and Japan (5%). Almost 75% of China's API exports **by value** went to these same markets, including the United States (12%), Europe (28%), India (17%), Southeast Asia (10%), and Japan (6%). The difference between China's API exports by volume and value is particularly noticeable in the case of Southeast Asia where the volume of API exports are high, but the value is low (**Figure 6**). Chinese API exports remain relatively disaggregated with the top ten Chinese exporters accounting for an estimated 9% of exports in 2019, and the following 43 top exporters accounting for 22% of exports. Chinese industry trade data may not be aggregating data by affiliated firms, which could show higher levels of corporate concentration. Large Chinese API exporters include Sinopharm Group Co., Ltd, Puluo Pharmaceutical, Livzon Pharmaceutical Group, Inc., Zhejiang Huahai Pharmaceutical Co., Ltd., Zhejiang Chemicals Import and Export Corporation, and Zhejiang Jiuzhou Pharmaceutical Co., Ltd.⁹⁰ Another Chinese state-tied API exporter, Harbin

R46507, *FDA's Role in the Medical Product Supply Chain and Considerations During COVID-19*, by Victoria R. Green, Agata Bodie, and Kate M. Costin.

⁸⁵ Stephanie Findlay, Hannah Kuchler, and Sarah Neville, "Drugmakers braced for coronavirus disruption to China supplies," *Financial Times*, February 12, 2020, <https://www.ft.com/content/8630c51c-4cc0-11ea-95a0-43d18ec715f5>; Reuters, "China Virus Outbreak Threatens Global Drug Supplies: European business group," February 17, 2020, <https://www.reuters.com/article/us-china-health-pharma-antibiotics/china-virus-threatens-global-antibiotics-supply-european-business-group-idUSKBN20C08S>.

⁸⁶ CRS calculations using data from the U.S. International Trade Commission's DataWeb (HTSUS 2941.30 and 2941.10).

⁸⁷ U.S. Food and Drug Administration, "Coronavirus (COVID-19) Supply Chain Update," Press release, February 27, 2020, <https://www.fda.gov/news-events/press-announcements/coronavirus-covid-19-supply-chain-update>.

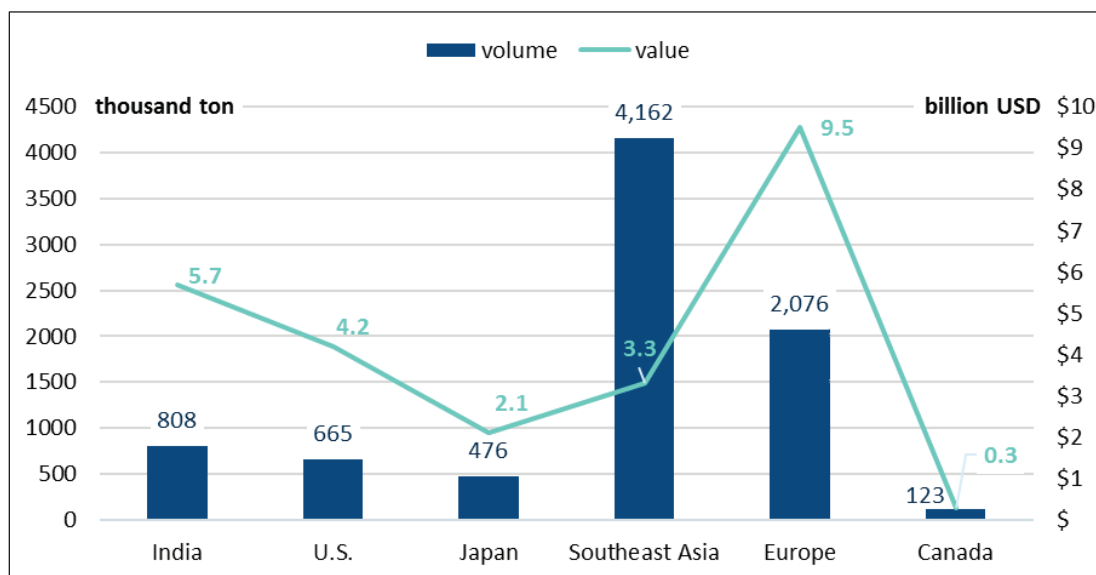
⁸⁸ Food and Drug Administration, "Frequently Asked Questions about Drug Shortages," last updated July 05, 2018, <https://www.fda.gov/drugs/drug-shortages/frequently-asked-questions-about-drug-shortages#q7>; and CDER Office of Compliance Office of Drug Security, Integrity & Recalls, "FDA Compliance Focal Point for Imports & Exports of CDER Regulated Drugs," <https://www.fda.gov/media/91681/download>.

⁸⁹ FDA, Testimony of Dr. Janet Woodcock, Director the Center for Drug Evaluation and Research, "Securing the U.S. Drug Supply Chain: Oversight of FDA's Foreign Inspection Program," December 10, 2019.

⁹⁰ "China's Export of API Products in 2019," China Chamber of Commerce for Import and Export of Medicines and Health Products, March 22, 2020, <http://www.cccmhpie.org.cn/Pub/9265/176049.shtml>; and Daxue

Pharmaceutical Group, Co., in August 2020 successfully bid for the U.S. supplements company GNC Holdings Inc.’s assets in bankruptcy proceedings, providing Harbin Pharmaceutical an extensive distribution and retail presence in the United States.⁹¹ GNC said that Harbin Pharmaceutical’s earlier strategic stake was approved by CFIUS in 2018 but some members of Congress still pressed for CFIUS to review the new transaction because of their concerns.⁹²

Figure 6. China’s API Exports by Volume and Value (2019)



Source: CRS with data from the China Chamber of Commerce for the Import and Export of Medicines and Health Products.

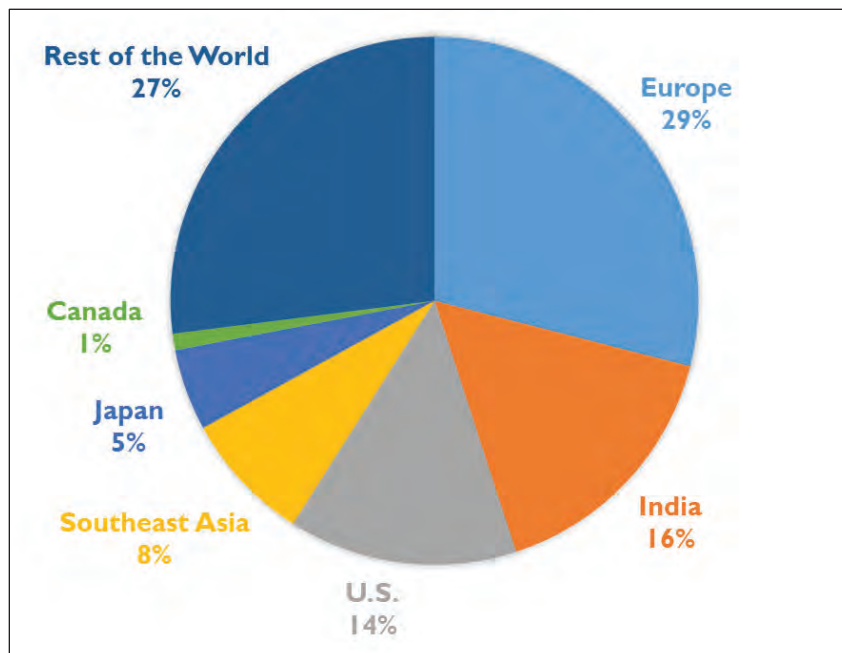
CRS has assessed China’s API-related exports in HTS Chapters 29 and 30 at the 6-digit tariff, level as reported by China Customs, to better assess specific trends in China’s API exports and to verify the trade data that has been reported by China’s industry association. The CRS assessment comes quite close to Chinese industry reports by trade value. The export market breakdowns using the CRS analysis by value are included below (**Figure 7**).

Consulting, “The API Industry in China: Producing and Exporting to the Global Market,” July 1, 2020, <https://daxueconsulting.com/api-industry-in-china/>.

⁹¹ Katherine Doherty, “GNC Cancels Auction, Pushes Forward with Sale to Chinese Sponsor,” *Bloomberg*, September 14, 2020, <https://www.bloomberg.com/news/articles/2020-09-14/gnc-cancels-auction-pushes-forward-with-sale-to-chinese-sponsor>.

⁹² Katy Stek Ferek, “Rubio Seeks Security Review of Chinese Bid for GNC,” *The Wall Street Journal*, September 10, 2020, <https://www.wsj.com/articles/rubio-seeks-security-review-of-chinese-bid-for-gnc-11599775144>.

Figure 7. China's API Export Destinations Based on Value (2019)



Source: CRS with data from China Customs.

Notes: Europe includes the 27 members of the European Union, Albania, Andorra, Belarus, Bosnia and Herzegovina, Iceland, Moldova, Monaco, Montenegro, North Macedonia, Norway, Russia, Serbia, Switzerland, Ukraine, and the United Kingdom.

Southeast Asia includes Brunei Darussalam, Cambodia, Indonesia, Laos, Malaysia, Myanmar, Philippines, Singapore, Thailand, and Vietnam.

China's role as the primary supplier of APIs to global manufacturers of generic pharmaceuticals, particularly in India, highlights that the U.S. market may be dependent on China API through third markets. Shortages of China's exports of API to India, for example, would likely increase overall costs of generic pharmaceuticals for consumers in the United States. India, which supplies approximately 40% of generic pharmaceuticals used in the United States, imports nearly 70% of its APIs from China.⁹³ In March 2020, India imposed export restrictions on several drugs whose supply chains rely on China, leading to fears of potential global shortages of generic drugs that have since escalated after India announced a nationwide 21-day lockdown.⁹⁴ Additionally, further tensions in China-India bilateral trade resulting from any intensification in the ongoing border tensions between the two countries could pose further risk to generic pharmaceutical supply chains.

Global Trade Restrictions

Amid concerns about the availability of personal protective equipment (PPE), medical supplies, and pharmaceuticals, a growing number of nations applied temporary export controls and other restrictions on the overseas sales of these products. While export controls do not necessarily

⁹³ Yanzhong Huang, "The Coronavirus Outbreak Could Disrupt the U.S. Drug Supply," *Council on Foreign Relations*, March 5, 2020, <https://www.cfr.org/in-brief/coronavirus-disrupt-us-drug-supply-shortages-fda>; Julianna Tatelbaum, "Fears of US drug shortages grow as India locks down to curb the coronavirus," *CNBC*, March 24, 2020.

⁹⁴ Reuters, "Global supplier India curbs drug exports as coronavirus fears grow," March 3, 2020.

prohibit export activity, they make export licenses a requirement, which could lead to transactions being delayed and potentially denied or cancelled. As medical professionals around the world scrambled to find gloves, face shields, protective garments, disinfectants, ventilators, and other equipment needed to fight COVID-19, these measures highlighted the risks—and exacerbated the challenges—of relying on complex global supply chains and distribution channels that are not sufficiently diversified.⁹⁵ World Trade Organization (WTO) rules prohibit export bans except for rare instances in which a member invokes a measure citing national security concerns. In an effort to promote transparency, the WTO published a list of temporary export bans that countries enact during the COVID-19 pandemic and notify to the WTO.⁹⁶ On March 30, 2020, the G-20 issued a joint statement that emphasized the importance of keeping markets open and ensuring the adequate production and fair and equitable distribution of medical products to where they are most needed. The statement emphasized that any measures a country might adopt to protect health should be targeted, proportionate, transparent, and temporary.⁹⁷

So far this year, China and more than 24 other economies, including India and the European Union,⁹⁸ imposed either limits or formal or *de facto* bans on certain exports.⁹⁹ Many of the measures temporarily restricted access to markets on which the United States depends for certain imports. These included medical ventilators (for which Singapore and China accounted for 35% and 17%, respectively, of U.S. imports in 2019), breathing and gas masks (France, the United Kingdom, and Italy, 47% combined), CT scanners (Germany, 50%), medical protective equipment of textile materials (China, 72%), digital and infrared thermometers (China, 36%), pharmaceuticals (Ireland, Germany, Switzerland, and Italy, 53% combined), and tetracycline and penicillin (China, 90% and 52%, respectively).¹⁰⁰ Many governments rescinded these temporary measures after the height of the COVID19 outbreak in their countries. China did not provide notice of its *de facto* export constraints that redirected supply for domestic use to the World Trade Organization (WTO), as other countries did.¹⁰¹

⁹⁵ Bryce Baschuk, “Export Bans on Medical Supplies to Hamper Global Virus Response,” *Bloomberg*, March 18, 2020. Some public health officials and trade experts have also expressed concern that export controls and other restrictions could reduce incentives for companies to ramp up production. See, for example, James Politi, Aime Williams, and Clive Cookson, “US official hits out at hoarding of coronavirus medical supplies,” *Financial Times*, March 5, 2020.

⁹⁶ World Trade Organization, “COVID-19 and World Trade,” last updated March 31, 2020, https://www.wto.org/english/tratop_e/covid19_e/covid19_e.htm.

⁹⁷ G20 Leaders’ Statement, “Extraordinary G20 Leaders Summit Statement on COVID-19,” March 30, 2020, [https://g20.org/en/media/Documents/G20_Extraordinary%20G20%20Leaders%E2%80%99%20Summit_Statement_EN%20\(3\).pdf](https://g20.org/en/media/Documents/G20_Extraordinary%20G20%20Leaders%E2%80%99%20Summit_Statement_EN%20(3).pdf).

⁹⁸ Lili Bayer, Jillian Deutsch, Jakob Hanke Vale, and Paola Tamma, “EU Moves To Limit Exports of Medical Equipment Outside the Bloc,” *Politico*, March 15, 2020.

⁹⁹ Simon J. Evenett, *Tackling Coronavirus: The Trade Policy Dimension*, Swiss Institute of International Economics and Department of Economics, University of St. Gallen, Switzerland, March 10, 2020. Some countries, including Australia, Brunei, Canada, Chile, Myanmar, New Zealand and Singapore, have pledged “to keep trade lines open.” Andrea Shalal, “U.S. Should Refrain from Export Controls in Pandemic Response: Chamber of Commerce,” *Reuters*, March 25, 2020; and World Customs Organization, “List of National Legislation of Countries that Adopted Temporary Export Restrictions on Certain Categories of Critical Medical Supplies in Response to Covid-19,” <http://www.wcoomd.org/en/topics/facilitation/activities-and-programmes/natural-disaster/list-of-countries-coronavirus.aspx>.

¹⁰⁰ CRS calculations using data from the U.S. International Trade Commission’s DataWeb and Global Trade Atlas.

¹⁰¹ World Trade Organization, “COVID-19: Trade and trade-related measures,” last updated July 31, 2020, https://www.wto.org/english/tratop_e/covid19_e/trade_related_goods_measure_e.htm.

China Customs Delays Release of January-February 2020 Trade Data

The Chinese government released top-level import and export figures to the media in early March 2020, but China Customs did not release its detailed January-February 2020 monthly trade data, as scheduled on March 19, 2020 until 11 days later on March 30, 2020. This data is important in providing additional details on trade patterns during the COVID-19 pandemic, including concentrated areas of trade drops, as well as shifting patterns of trade for medical supplies in and out of China. China Customs also delayed data releases in 2018 during the several rounds of U.S. tariffs and PRC counter-tariffs under Section 301, raising questions about the Chinese government's motives and the accuracy of the data eventually released.¹⁰² Analysts assess it is possible that the Chinese government in these cases sought to adjust official trade data to reflect broader policy objectives and minimize any signs of economic or trade downturn.

Domestic Supply: U.S. vs Foreign Made Products

The COVID-19 pandemic exposed the gaps in U.S. domestic industry and trade data that complicated the ability to assess U.S. domestic capabilities in relation to global supply and trade dependencies for critical products in a time of crisis.¹⁰³ In general, the U.S. government does not keep records of the domestic production of specific, individual items (e.g., surgical masks and gloves) by quantity or value—and the U.S. government also does not track how much of this production is ultimately destined for the U.S. market.¹⁰⁴ Of what the United States produces domestically, the U.S. government tracks categories of products that are exported to foreign markets. It also collects statistics for broad industry sectors, such as gross output, value added—also known as gross domestic product (GDP) by industry—and intermediate inputs.¹⁰⁵ Another complicating factor in the analysis of U.S. production—and U.S. reliance on imports—of PPE and medical products is that there are no domestic or internationally agreed guidelines, standards, or definitions of what specific products make up these categories. Therefore, questions such as “how much PPE does the United States currently produce relative to what it imports?” or “by how much has domestic production of pharmaceuticals increased since the COVID-19 outbreak?” are difficult to answer.¹⁰⁶

However, data from an annual government survey of U.S. manufacturers, analyzed in conjunction with official U.S. trade statistics, may give a partial insight into some domestic production activities and provide a rough estimate of the share that imported PPE and medical products account for of total U.S. supply.

¹⁰² Chen Aizhu and Tom Daly, “Where’s the Data? Angst for Commods Traders as China Trade Figures Held in Limbo,” Reuters, June 1, 2018, <https://www.reuters.com/article/us-usa-trade-china-data/wheres-the-data-angst-for-commods-traders-as-china-trade-figures-held-in-limbo-idUSKCN1IX4LQ>.

¹⁰³ For more detail, see CRS In Focus IF11648, *Medical Supply Chains and Policy Options: The Data Challenge*, by Andres B. Schwarzenberg and Karen M. Sutter.

¹⁰⁴ The U.S. Department of Commerce, for example, collects more information than it makes publicly available due to confidentiality requirements (e.g., 13 U.S.C § 9 and 15 C.F.R. § 801.5). However, that information does not include details on specific items produced by manufacturing establishments.

¹⁰⁵ For more detail, see U.S. Bureau of Economic Analysis, “Industry Economic Accounts,” at <https://www.bea.gov/data/economic-accounts/industry>. However, quantity and value information of total U.S. production is not available at the item level.

¹⁰⁶ See CRS In Focus IF11648, *Medical Supply Chains and Policy Options: The Data Challenge*, by Andres B. Schwarzenberg and Karen M. Sutter.

Annual Survey of Manufactures and Trade Statistics

The U.S. Census Bureau’s Annual Survey of Manufactures (ASM) measures current U.S. manufacturing activity such as industry outputs, inputs, and operating status.¹⁰⁷ It provides sample estimates of statistics for manufacturing establishments in the United States based on the North American Industry Classification System (NAICS).¹⁰⁸

The ASM statistics include the value added by manufacturing, total value of shipments for close to 1,400 classes of manufactured products, costs of materials, and inventories. NAICS categories capture most, but not necessarily all, establishments producing PPE and medical products. However, there is a time lag with the data, which presents challenges in developing a real time picture of the industry, as 2018 is the most recent year for which data are available.¹⁰⁹

In addition, the U.S. Bureau of Economic Analysis (BEA) and the Census Bureau collect data on U.S. imports on a monthly, quarterly, and yearly basis.¹¹⁰ Using these data, and matching them with the ASM, CRS was able to obtain a rough estimate of the imported—and thereby infer the domestic—share of U.S. supply for categories considered to include PPE, pharmaceuticals, and other medical-related products in 2018 (**Table 6**). The figures were calculated at the NAICS 6-digit subheading level—the most disaggregated level for which NAICS data are available. However, because these are broad categories, the data may underestimate or overestimate actual domestic production and imports.¹¹¹

Estimates suggest that the United States seems to be heavily dependent on certain imports (for more than 90% of domestic supply in some cases). However, foreign source dependence varies by product category. In 2018, the United States imported many low-end and labor-intensive manufactured products primarily from China (e.g., apparel from fabric such as hospital gowns). Many of the higher value added and skill-intensive imported products, on the other hand, came mainly from Europe (e.g., irradiation machines and biological products such as vaccines).

**Table 6. Estimate of the Imported Share of U.S. Domestic Supply:
Select Medical-Related Manufactured Good Categories in 2018**

Share of Domestic Supply (%)				
NAICS Code	Description	Total Supply Imports	U.S. Imports from European Union	U.S. Imports from China
315220	Men’s and Boys’ Cut and Sew Apparel [apparel from fabric, including hospital/medical/laboratory service apparel]	98	3	20

¹⁰⁷ U.S. Census Bureau, “Annual Survey of Manufactures (ASM),” at <https://www.census.gov/econ/overview/ma0300.html>.

¹⁰⁸ For more detail on NAICS, see U.S. Census Bureau, “North American Industry Classification System: Introduction to NAICS,” at <https://www.census.gov/eos/www/naics/>.

¹⁰⁹ U.S. Census Bureau, “Annual Survey of Manufactures: Summary Statistics for Industry Groups and Industries in the U.S.: 2018.”

¹¹⁰ U.S. Department of Commerce, U.S. Bureau of Economic Analysis (“International Transactions” and “International Trade in Goods and Services”) and U.S. Census Bureau (“Foreign Trade”).

¹¹¹ U.S. import statistics include imports of goods from U.S.-owned affiliates abroad.

NAICS Code	Description	Total Supply Imports	U.S. Imports from European Union	U.S. Imports from China
315240	Women's, Girls', and Infants' Cut and Sew Apparel [apparel from fabric, including hospital/medical/laboratory service apparel]	96	3	36
333314	Optical Instruments and Lenses [microscopes, telescopes, prisms, and lenses; coating or polishing lenses; and mounting lenses]	94	14	23
325414	Biological Products (Except Diagnostic) [vaccines, toxoids, blood fractions, and culture media of plant or animal origin, except diagnostic]	79	59	*
339115	Ophthalmic Goods [prescription eyeglasses, contact lenses, sunglasses, eyeglass frames, reading glasses made to standard powers, and protective eyewear]	60	22	20
313210	Broadwoven Fabrics [fabrics and felts, including surgical gauzes]	55	10	17
325411	Medicinal and Botanical Drugs and Vitamins [uncompounded medicinal chemicals and their derivatives and botanicals]	48	34	8
325413	In-Vitro Diagnostic Substances [chemical, biological, or radioactive diagnostic substances]	48	27	3
325199	All Other Basic Organic Chemicals [isopropyl alcohol and glycerin]	42	14	9
334517	Irradiation Apparatus [beta-rays, gamma-rays, X-rays, or other ionizing radiation apparatus]	41	25	4
339113	Surgical Appliances and Supplies [orthopedic devices, prosthetic appliances, surgical dressings, crutches, surgical sutures, personal industrial safety devices]	39	15	6
325412	Pharmaceutical Preparations [in-vivo diagnostic substances and pharmaceutical preparations]	39	23	*
339112	Surgical and Medical Instruments [syringes, needles, anesthesia apparatus, blood transfusion equipment, catheters, surgical clamps, and medical thermometers]	36	10	2

Source: CRS analysis with data from the U.S. Census Bureau and the U.S. International Trade Commission.

Notes: Shares are rough estimates calculated at the NAICS 6-digit subheading level, which may cover products that are not for medical use. 2018 is the most recent year for which annual data from the ASM are available.

* = Share of domestic supply is less than 0.05%. Descriptions in brackets are only select examples of products or items covered by the NAICS subheading.

This picture, however, may have changed between 2018 and 2020 as China capitalized on the investments that the government has made in recent years to push ahead on ambitious state-led programs such as *Made in China 2025* (MIC2025).¹¹² One of the goals of MIC2025 is to modernize the Chinese economy and turn China into a global leader in the manufacturing of biopharmaceuticals and high-performance medical devices. Lack of data and other constraints limit the U.S. ability to assess in real time the progress of these efforts and their impact on the U.S. economy and industrial base.

Other Sources of Data and Information

Sizing up the U.S. government's reliance on foreign goods faces similar challenges in data limitations.¹¹³ The U.S. General Services Administration (GSA) maintains a database, the Federal Procurement Data System-Next Generation (FPDS-NG, or FPDS), where federal agencies are required to report procurement contracts whose estimated value is \$10,000 or more.¹¹⁴ The procurement data in FPDS-NG are not fully reliable. There are documented quality issues documented relating to accuracy, completeness, and timeliness of its data.¹¹⁵ These limitations have prompted many analysts to rely on FPDS-NG data primarily to identify broad trends and produce rough estimates, or to gather information about specific contracts. With these limitations in mind, FPDS-NG data may provide general information regarding the value, quantity, and types of domestic and foreign-made goods that U.S. government agencies procure.

Other information on domestic capacity, as well as changes resulting from increased production in the aftermath of the COVID-19 outbreak, generally comes from private research firms, news outlets, and trade associations. Many of the figures cited are often based on surveys, firms' press releases, or firms/industries' forecasts, which may differ significantly from actual production.

China's Economic Recovery: Prospects and Implications

China's leaders have focused on resuming manufacturing production to jumpstart economic growth.¹¹⁶ At an executive session of China's cabinet, the State Council, on March 17, 2020, Chinese officials emphasized the importance of stabilizing employment and announced that the government would streamline business approvals and fast-track approvals for large infrastructure projects. They also offered government support to alleviate shortages of labor, raw materials, funds, and protective gear.¹¹⁷ To facilitate economic activity, the Chinese government also appears

¹¹² For more detail on MIC2025, see CRS In Focus IF10964, "*Made in China 2025*" Industrial Policies: Issues for Congress, by Karen M. Sutter.

¹¹³ For more detail on the role of international trade in U.S. government procurement, see CRS In Focus IF11580, *U.S. Government Procurement and International Trade*, by Andres B. Schwarzenberg.

¹¹⁴ Although it is not material for the immediate purposes of this report, the primary federal procurement reporting tool is scheduled to move from FPDS to the System for Award Management (SAM) in October 2020.

¹¹⁵ For more information on FPDS-NG data quality issues, see "Appendix A. FPDS Background, Accuracy Issues, and Future Plans" in CRS Report R44010, *Defense Acquisitions: How and Where DOD Spends Its Contracting Dollars*, by John F. Sargent Jr. and Christopher T. Mann.

¹¹⁶ Ryan Woo, Se Young Lee, David Stanway, and Andrew Galbraith, "Goldman Sees China's Economy Shrinking 9 Percent in First Quarter Amid Coronavirus Outbreak," *Reuters*, March 16, 2020, <https://www.reuters.com/article/us-health-coronavirus-china-toll/goldman-sees-chinas-economy-shrinking-9-in-first-quarter-amid-coronavirus-outbreak-idUSKBN21340T>.

¹¹⁷ Hua Xia, "China Advances Streamlining Approval Procedures, Fostering New Growth Drivers to Keep

to have liberalized company health requirements and lifted intra-provincial and intra-city travel and transportation restrictions. NDRC spokesperson Meng Wei said on March 17, 2020 that transportation was operating normally. Zhejiang, Jiangsu, and Shanghai were operating at close to 100% of normal capacity; and over 90% of large-scale industrial companies outside of Hubei had resumed production.¹¹⁸ Company reports of opening and resumption of operations did not necessarily mean that these facilities were fully online or operating at pre-crisis levels, however. Several economic analysts and news outlets, including the *Financial Times*, published alternative measures of business resumption rates using proxies for economic activity—such as data on traffic congestion, air pollution levels, and container freight movement. Overall, many of these measures suggested that businesses across China did not return to full capacity at the rates reported by local and provincial governments.¹¹⁹ In Wuhan, the center of the original outbreak, the Hubei provincial government issued a notice in March—that applies to Wuhan as Hubei’s capital—allowing certain companies to resume work ahead of other production. This included companies in the medical and health industry, as well as companies producing protective gear, disinfectant, daily necessities, agriculture, and products critical to national and global supply chains.¹²⁰

China emerged in June 2020 as the first major country to announce a return to economic growth since the outbreak of COVID-19, but consumption lagged production recovery and the economic recovery has relied on government spending and exports to boost growth. The government reported 3.2% gross domestic product (GDP) growth in the second quarter and 4.9% GDP growth in the third quarter of 2020.¹²¹ The International Monetary Fund (IMF) projects China’s economy to grow by 1.9% in 2020. China since February 2020 has provided an estimated \$506 billion in stimulus and increased the government’s budget deficit target to a record high of 3.6% of GDP, up from 2.8% in 2019. Shifting from efforts to reduce debt, the government announced the issuance of \$142.9 billion of special treasury bonds for the first time since 2007; increased the quota for local government special bonds (a source of infrastructure funding); and fast-tracked issuance of corporate bonds to cover pandemic costs, but with potential broader uses. The IMF estimates that the fiscal measures and financing plans announced amounted to 4.1% of the China’s GDP, as of July 2020.¹²² China’s National Bureau of Statistics in November 2020 recorded a 5% year-on-year increase in retail sales, a 2.6% year-on-year increase in fixed asset investment, and a 7% year-on-year increase in value-added industrial output. The largest growth

Employment Stable,” Xinhua, March 17, 2020, http://www.xinhuanet.com/english/2020-03/17/c_138888715.htm.

¹¹⁸ Ryan Woo, Se Young Lee, David Stanway, and Andrew Galbraith, “Goldman Sees China’s Economy Shrinking 9 Percent in First Quarter Amid Coronavirus Outbreak,” *Reuters*, March 16, 2020, <https://www.reuters.com/article/us-health-coronavirus-china-toll/goldman-sees-chinas-economy-shrinking-9-in-first-quarter-amid-coronavirus-outbreak-idUSKBN21340T>.

¹¹⁹ John Burn-Murdoch, Cale Tilford, Steven Bernard, Keith Fray, and Alan Smith, “Coronavirus Economic Tracker: Latest Global Fallout,” *Financial Times*, accessed March 26, 2020; and “Coronavirus: Getting China Back to Work,” Trivium China, last updated April 1, 2020, <https://triviumchina.com/2020/03/07/coronavirus-getting-china-back-to-work/>.

¹²⁰ Li Yan, “Wuhan Companies Begin to Resume Production,” *China Daily*, March 17, 2020, <http://www.ecns.cn/m/business/2020-03-17/detail-ifzunmih1236408.shtml>.

¹²¹ National Bureau of Statistics of China, “Preliminary Accounting Results of GDP for the Third Quarter of 2020,” October 21, 2020, http://www.stats.gov.cn/english/PressRelease/202010/t20201021_1795384.html.

¹²² International Monetary Fund, “Policy Responses to COVID-19,” updated December 4, 2020, <https://www.imf.org/en/Topics/imf-and-covid19/Policy-Responses-to-COVID-19#C>.

in investment in industrial output growth, however, was recorded in non-ferrous metals and real estate investment, not broader areas of domestic consumption.¹²³

China Positioning to Export

China's economy depends on exports and the foreign exchange it earns through exports, as well as on the large productive role that foreign firms play in the domestic market and as exporters. Seeking to stabilize drops in foreign investment and trade, on March 12, Commerce Vice Minister Wang Shouwen held a call with 400 members of the American Chamber of Commerce in China, and on March 13, he held a similar webinar with the European Chamber of Commerce in China's Advisory Council. Vice Minister Wang pressed companies to reopen operations and increase investments in China. Other Chinese agencies represented included NDRC, MIIT, the National Health Commission, the General Administration of Drug Supervision, the State Administration for Market Regulation, the General Administration of Customs, the Civil Aviation Administration of China, the Ministry of Transportation, and the State Taxation Administration.¹²⁴

During past crises, such as the global financial crisis of 2008-09, China has pressed firms to idle facilities and keep them production-ready (instead of shuttering them) and retain workers (instead of laying them off) to maintain social stability and facilitate efforts to quickly ramp up production and exports later.¹²⁵ These stimulus efforts are sometimes less visible than fiscal policies in other countries. Several market watchers have noted that, while a 17% drop in Chinese exports in January-February 2020 was significant, it was not as dramatic when considering China's economy was shuttered for much of February. This indicates that Chinese industry may have had sufficient stock already at ports for export when the crisis hit. This also signals how China was able to resume an export push in the third quarter of 2020.¹²⁶

China's economic recovery has been important to the United States and the global economy, as it is an important center of demand and supply. At the same time, during this period of global economic downturn, the United States and other countries are now potentially vulnerable to a concerted PRC export push that has been expanding since summer 2020 and any effort China makes to take additional market share in strategic sectors.

¹²³ China's National Bureau of Statistics, "2020 年 1-11 月固定资产投资（不含农户）增长 2.6% (Fixed Asset Investment in China (Excluding Rural Areas) Increased by 2.6% Between January and November 2020)," December 15, 2020, http://www.stats.gov.cn/tjsj/zxfb/202012/t20201215_1809265.html?mc_cid=9e6eedccdb&mc_eid=ac692ae0c2.

¹²⁴ "MOFCOM VM Wang Shouwen Holds Back to Work Call," American Chamber of Commerce in China, March 19, 2020, <https://www.amchamchina.org/news/mofcom-vm-wang-shouwen-holds-back-to-work-call>; and "European Chamber's Conference Call with the Vice Minister of Commerce Wang Shouwen Joined by Multiple Departments on COVID-19's Impact to FIEs," European Chamber of Commerce in China, March 13, 2020, https://www.europeanchamber.com.cn/en/lobby-actions/3949/European_Chamber_s_Conference_Call_with_Vice_Minister_of_Commerce_Wang_Shouwen_Joined_by_Multiple_Departments_on_COVID_19_Impacts_to_FIEs.

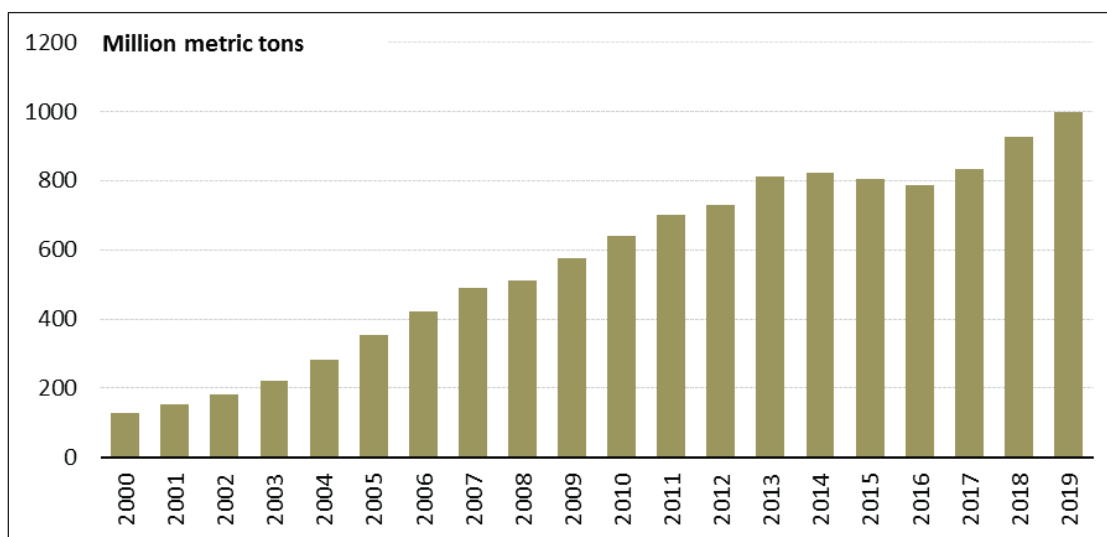
¹²⁵ Yukon Huang, "China's Economic Growth Now Depends on the West," *Carnegie Endowment for International Peace*, March 19, 2020, <https://carnegieendowment.org/2020/03/19/china-s-economic-growth-now-depends-on-west-pub-81326>.

¹²⁶ "China January-February Exports Tumble, Imports Down as Coronavirus Batters Trade and Business," *Reuters*, March 6, 2020, <https://www.reuters.com/article/us-china-economy-trade/china-january-february-exports-tumble-imports-down-as-coronavirus-batters-trade-and-business-idUSKBN20U05R>.

Steel Overcapacity

Chinese overcapacity in steel has been highly contentious for its global impacts, and China could potentially see exports as a quick way to reduce inventories and secure needed cash. Similar to what happened during the global financial crisis in 2008-09, China is poised to take additional global market share in 2020 because it did not dial back production during the COVID-19 outbreak. Chinese blast furnaces continued to run during the COVID-19 crisis, and China's steel production for January-February 2020 was up 3% over the same period in 2019. Meanwhile, due to collapsing domestic demand and logistics constraints, China's finished steel inventories rose by 45% in January-February 2020 over the same period in 2019.¹²⁷ China's steel production at the end of 2019 was already at an all-time high of almost 1 billion tons, with China producing over 50% of global supply, according to the World Steel Association and China's State Statistical Bureau (**Figure 8**).¹²⁸ China's crude steel production recovered in July 2020, rising 9.1% year-on-year. China's crude steel production during the January-September 2020 period is up 4.5% over the same period in 2019. In contrast, crude steel production over the same period is down 17.9% in the EU; down 18.2% in North America; down 16.5% in India; down 19.1% in Japan; and down 7.5% in South Korea.¹²⁹

Figure 8. China Raw Steel Production (2000-2019)



Source: CRS with data from the World Steel Association.

Export VAT Rebate

On March 17, 2020, China's Ministry of Finance announced an increase in the export value added tax (VAT) rebate for almost 1,500 Chinese products, effective March 20, 2020. Most of the

¹²⁷ Anindya Barman Zacks, "China Steel Output Rises Despite Oversupply and Coronavirus," *Yahoo Finance*, March 19, 2020.

¹²⁸ "World Steel in Figures 2019," World Steel Association, <https://www.worldsteel.org/media-centre/press-releases/2019/world-steel-in-figures-2019.html>; Min Zhang and Tom Daly, "China 2019 Crude Steel Output Jumps 8.3%, Sets Second Straight Annual Record," *Reuters*, January 16, 2020.

¹²⁹ "July 2020 Crude Steel Production," World Steel Association, August 24, 2020.

products (1,084) received a 13% rebate; a small number (380) received a 9% rebate.¹³⁰ The export VAT rebate is a focused policy tool with quick effects that China typically employs to boost targeted exports during times of slowdown. It typically reduces the export VAT on products down to or close to zero (**Table 7**).

The rebates reflect a strong policy push for steel exports, as well as construction and building materials (e.g., insulation, wood products, glass and fiberglass). China also promoted the export of a range of insecticides and industrial and organic chemicals. The rebates encouraged the export of agricultural products in categories for which China promised to increase purchases from the United States—such as live breeding animals, meat and dairy—suggesting the government may have incentivized exports for industries that might face additional U.S. imports. Absent in China’s policy push were incentives to encourage the sale of pharmaceuticals, PPE, and other medical products overseas.

The export VAT rebates also appear to have incentivized China’s export of wild animals and their byproducts overseas (**Table 7**). With assessments that COVID-19 could have originated in wild animals and potentially passed to humans in open air markets that sell these animals, China’s National People’s Congress announced on February 24 a ban on the sale and consumption of wild animals in China.¹³¹ While the export incentive might have help the government to eradicate domestic markets by providing an economic incentive to export, this move could have spread the risk to the global market.

Table 7. China’s Export VAT Rebates, March 2020 (9%-13%)

Category	Examples
Livestock (Breeding)	Horses, cattle, pigs, goats, sheep, chicken, turkey, ducks
Meat (Fresh, Cold, Frozen, Byproducts)	Beef, pork, chicken, lamb
Dairy	Milk and eggs
Wild Exotic Animals (Live, Frozen, Horns, Claws, Fur, Feathers)	Monkeys, edible snakes and reptiles, turtles, raptors, ostrich, pigeon, beaver, civet; rhino horn
Cotton, Flowers, Vegetables, Fruits, Oils, Nuts, Spices	Orchids, garlic
Industrial and Organic Chemicals; Insecticides	Used in paints, nylon, latex, rubber, plastics, welding, anesthetics, and disinfectants
Dental and Paper Products	floss, paste, toilet paper, tissue, napkins, paper towels
Wood, Stone Mills, Sandpaper	boxes, planks, windows, doors tables
Insulation and Drywall; Glass and Fiberglass	
Pearls, Gemstones, Diamonds for Industrial Use	
Steel and Nickel	117 products in Chapters 72 and 73 including bars and rods, wire, strip, cold rolled, and hot rolled steel; stainless bars, rods and wire; pipes and tubes; containers and parts; nickel bars, plate, and sheet

¹³⁰ “Announcement on Increasing the Export Tax Rebate Rate for Some Products,” PRC Ministry of Finance Announcement No. 15, March 17, 2020, <http://www.chinatax.gov.cn/chinatax/n810341/n810755/c5146338/content.html>.

¹³¹ “China’s Legislature Adopts Decision on Banning Illegal Trade, Consumption of Wildlife,” Xinhua, February 24, 2020, http://www.xinhuanet.com/english/2020-02/24/c_138814328.htm.

Source: China's Ministry of Finance.

China Pushing Ahead in Strategic Sectors

Now apparently past its peak of the COVID-19 outbreak, China is prepared to push ahead on goals outlined in its Made in China 2025 (MIC 2025) industrial plan, which includes several strategic health sectors (**Figure 9**). Introduced by China's State Council in May 2015, MIC 2025 is an ambitious state-led program that seeks to create competitive advantages for China in certain strategic industries. The plan aims to move China up the manufacturing value chain, expand its global market competitiveness, and reduce its reliance on foreign firms and their intellectual property (IP) over time (**Figure 9**). The program was a major focus of the Trump Administration's Section 301 actions against China because of the distorting and predatory policies the initiative has set in motion related to technology transfer, intellectual property, and innovation.¹³²

Figure 9. China's Industrial Priorities (2015-2025)

The "Made in China 2025" plan highlights 10 sectors:	
 New generation information technology	 New energy and energy-saving vehicles
 High-end computerized machines and robots	 Energy equipment
 Aerospace	 Agricultural machines
 Maritime equipment and high-tech ships	 New materials
 Advanced railway transportation equipment	 Biopharma and high-tech medical devices

Source: Notice of the State Council on Issuing Made in China 2025, May 8, 2015, Guofa [2015] No. 28.

Despite relying on China for certain PPE and API, the United States, together with Europe, is a global leader in high-end medical devices and novel pharmaceutical drug innovation, sectors in which China is seeking to gain ground through its industrial policies such as MIC2025. U.S. efforts to re-shore or diversify supply chains have been primarily responding to crisis and may not be fully considering strategic questions about how to sustain U.S. competitiveness in advanced medical sectors given China's state-led policies that aim to dilute these advantages over time. Biotechnology, pharmaceuticals, and medical devices are key components of MIC 2025 industrial plans that support Chinese firms in efforts to increase their global market share of

¹³² See CRS In Focus IF10964, "Made in China 2025" Industrial Policies: Issues for Congress, by Karen M. Sutter.

generic drugs and medical equipment, and develop new innovative drugs. Toward this end, the Chinese government restricts market access for foreign pharmaceutical firms. It requires foreign firms to conduct clinical trials in China, disclose proprietary information for drug trials and sales, and enter into partnerships to secure a spot on reimbursable drug lists. Moreover, medical equipment subsidies require that 60% of a product's components be produced in China by a PRC firm.¹³³ These policies continue despite amendments to the Drug Administration Act in 2019 which were designed to make it easier for foreign pharmaceutical companies to operate in China.

China may have served its commercial ambitions in decisions it made during the height of the COVID-19 outbreak in China:

- China restricted access to medical information and research about COVID-19, including access for the U.S. Centers for Disease Control and Prevention (CDC), and potentially put U.S. science, research and development (R&D), and industry at a disadvantage.¹³⁴ While some of these controls may have been politically motivated, they also may have been driven by China's market ambitions. The government's tight controls over biotechnology and pharmaceutical testing, treatment, and analysis in China could advantage its state firms.
- China also appears to see the race to develop a vaccine in terms of economic and geopolitical competition. Since the COVID-19 outbreak, Chinese government-linked hackers have reportedly targeted several U.S. pharmaceutical companies developing COVID-19 vaccines and therapeutics, such as Moderna, and U.S. academic labs engaged in COVID-19 research, including the University of North Carolina.¹³⁵ China's state firm Fosun Pharma has obtained commercialization and distribution rights for the Pfizer-BioNTech COVID-19 vaccine in China through a strategic investment stake in BioNTech, while China looks to globally distribute the vaccines developed by its state-tied firms through arrangements that some have said will look to advance China's geopolitical goals (Also see pp. 8-9).¹³⁶
- China ordered that all viral samples from the beginning of the COVID-19 outbreak be destroyed or sent to the Wuhan Institute of Virology, a national lab run by China's military. This move centralized the government's knowledge about the potential origins of the virus and provided unique insights about its trajectory and treatment. that do not have appeared to have been shared outside China.¹³⁷ In March 2020, the Chinese Academy of Military Medical Sciences and

¹³³ Robert D. Atkinson, "China's Biopharmaceutical Strategy: Challenge or Complement to U.S. Industry Competitiveness?" ITIF, August 12, 2019, <https://itif.org/publications/2019/08/12/chinas-biopharmaceutical-strategy-challenge-or-complement-us-industry>.

¹³⁴ Nectar Gan, Caitlin Hu and Ivan Watson, "Beijing Tightens Grip Over Coronavirus Research, Amid U.S.-China Row on Virus Origin," CNN, April 16, 2020.

¹³⁵ Christopher Bing and Marisa Taylor, "Exclusive: China-Backed Hackers 'Targeted' COVID-19 Vaccine From Moderna," *Reuters*, July 30, 2020; and Julian E. Barnes and Michael Venutolo-Mantovani, "Race for Coronavirus Vaccine Pits Spy Against Spy," *The New York Times*, September 5, 2020.

¹³⁶ Jia Tianqiong and Denise Jia, "Exclusive: Fosun to Import 7.2 Million Doses of BioN-Tech-Pfizer Vaccine," *Caixin*, December 12, 2020, <https://www.caixinglobal.com/2020-12-12/exclusive-fosun-to-import-72-million-doses-of-biontech-pfizer-vaccine-101638506.html>, and Chao Deng, "China Seeks to Use Access to Covid-19 Vaccines for Diplomacy," *The Wall Street Journal*, August 17, 2020.

¹³⁷ Gao Yu, Peng Yanfeng, Yang Rui, Feng Yuding, Ma Danmeng, Flynn Murphy, Han Wei, and Timmy Shen, "In Depth: How Early Signs of a SARS-Like Virus Were Spotted, Spread, and Throttled," *Caixin*, February 29, 2020, <https://www.caixinglobal.com/2020-02-29/in-depth-how-early-signs-of-a-sars-like-virus-were-spotted-spread-and>

CanSino Biologics, Ltd. were the first globally to begin a vaccine clinical study.¹³⁸ The Wuhan Institute of Virology operates China's only biocontainment level 4 (P4) lab, a specialized facility for studies on highly contagious and fatal diseases. The Lab was developed by the Merieux Foundation under a government agreement between France and China.¹³⁹

- In another effort by the Chinese government to control access to important health information, the World Health Organization (WHO)'s initial visit to China came over a month after the outbreak of the virus. Only a subset of the WHO-China Joint Mission on COVID-19 delegation was allowed to visit Wuhan.¹⁴⁰ In July 2020, the WHO team tasked with investigating the origins of COVID-19 met with officials in Beijing to draw up terms of reference and conditions of access with Chinese officials. The WHO's visit to Wuhan that is scheduled for January 2021 has been criticized in western media as being overly scripted and controlled by the Chinese government.¹⁴¹
- China appears to have been slow to approve foreign drug patents potentially relevant to COVID-19 until it needed them at the height of the crisis. For example, Gilead Sciences—a U.S. company based in California—had several patents for its antiviral drug Remdesivir's use in coronaviruses that had been pending approval since 2016. The Chinese government had required the company to conduct clinical trials in China and did not approve these patents until well into the crisis. The Chinese government may have benefitted from long-standing foreign patent application information that becomes public over time once a patent application is filed in China, even if the approval is still pending. The Chinese government also likely benefitted from the insights gained through the clinical trials conducted in China and the viral samples that foreign companies share. Gilead, as well as other U.S. companies, sent the Chinese government samples of its drugs during the COVID-19 outbreak.¹⁴²

throttled-101521745.html; and Huang Shulun, Huang Huizhao, Peng Yanfeng, Liu Yuan, and Tang Ziyi, "Destroyed Market Samples Make it Impossible to Trace Origin of Deadly Virus, Experts Say," Caixin, February 8, 2020, <https://www.caixinglobal.com/2020-02-08/destroyed-market-samples-make-it-impossible-to-trace-origin-of-deadly-virus-expert-says-101513162.html>.

¹³⁸ Ryan Cross, "CanSino Publishes First COVID-19 Vaccine Data to Muted Response," *Chemical and Engineering News*, May 28, 2020.

¹³⁹ "China Inaugurates the First Biocontainment Level 4 Laboratory in Wuhan," Wuhan Institute of Virology, China Academy of Sciences, February 3, 2015, http://english.whiov.cas.cn/News/Events/201502/t20150203_135923.html.

¹⁴⁰ "Report of the WHO-China Joint Mission on Coronavirus 2019 (COVID-19), February 16-24, 2020, <https://www.who.int/docs/default-source/coronaviruse/who-china-joint-mission-on-covid-19-final-report.pdf>.

¹⁴¹ Javier C. Hernandez and Amy Qin, "China Uses WHO Inquiry to Tout Coronavirus Response," *The New York Times*, July 22, 2020, and Ian Birrell, "Will We Ever Learn the Truth About China and the Pandemic," *The Daily Mail*, December 19, 2020, <https://www.dailymail.co.uk/news/article-9071191/Will-learn-truth-China-pandemic-writes-IAN-BIRRELL.html>; John Sudworth, "Covid: Wuhan Scientist Would 'Welcome' Visit Probing Lab Leak Theory, BBC News, December 20, 2020, <https://www.bbc.com/news/world-asia-china-55364445>; and Selam Gebrekidan, Matt Apuzzo, Amy Qin, and Javier C. Hernandez, "In Hunt for Virus Source, WHO Let China Take Charge," *The New York Times*, November 3, 2020, <https://www.nytimes.com/2020/11/02/world/who-china-coronavirus.html>.

¹⁴² Jay Barmann, "Bay Area-Based Gilead Sees Potential Legal Conflict with China Over its Coronavirus Drug," SFIST, February 6, 2020, <https://sfist.com/2020/02/06/bay-area-based-gilead-donates-experimental-anti-viral-drug-to-china/>; and Elise Mak, "Gilead's Remdesivir Enters China Phase III Trial to Fight Coronavirus," BioWorld, February 3, 2020, <https://www.bioworld.com/articles/432804-gileads-remdesivir-enters-china-phase-iii-trial-to-fight-coronavirus>.

- The Chinese government cracked down on BrightGene BioMedical Technology Co.—a PRC firm based in Suzhou, China—for the company’s premature announcement that it could compound a generic version of Remdesivir. The government’s move may have been less of an effort to protect foreign firms than to position China’s national labs. The Wuhan Institute of Virology, for example, applied to patent an adaptation of Remdesivir.¹⁴³ This could potentially complicate Gilead’s and other U.S. firms’ way forward in China.
- China offered significant funding to Chinese biotech, pharmaceutical, and health logistics companies to expand capacity and capabilities to combat COVID-19. For example, Jointown—a top Chinese medical supplier—issued preferential bonds in February 2020, and the State Council’s CITIC purchased private placement shares in the company.¹⁴⁴

As the pandemic control measures have continued in other countries, PRC official media has featured stories about how China’s leadership has been using its current control of medical production and supply chains to selectively help other countries, while promoting ties to China. State media also has been highlighting China’s interest in advancing its global medical leadership role. China’s global health leadership was a key element of people-to-people exchanges envisioned in China’s initial rollout of its “One Belt One Road” initiative in 2015.¹⁴⁵ During a call to Italian Prime Minister Conte on March 17, 2020, Chinese Communist Party Chairman Xi Jinping referenced a new Chinese government initiative—a Health Silk Road—that appears designed to promote Chinese leadership and products in the health sector.¹⁴⁶ Such efforts also aim to deflect criticism of China’s alleged corralling and destruction of the initial virus samples and efforts to prevent sharing of information among medical practitioners and the global community. Some experts have highlighted how this suppression of health information violates the obligations of WHO members to immediately share information about outbreaks for the safety of the world.¹⁴⁷

The Chinese government reportedly undertook extraordinary measures during the COVID-19 outbreak to sustain R&D and manufacturing for priority national projects and in strategic sectors—such as telecommunications, microelectronics, and semiconductors—including in Wuhan, the epicenter of China’s outbreak. These efforts have potential ramifications for U.S. and foreign firms’ relative competitive market position as companies compete in 5G and other emerging sectors. According to the *Nikkei Asia Review*, in February and March 2020, the Chinese government operated special transportation and quarantined dormitories at Yangtze Memory

¹⁴³ “Chinese Biotech Censured for False Claim on Gilead’s Virus Drug,” Bloomberg News, March 1, 2020, <https://www.bloomberg.com/news/articles/2020-03-02/chinese-biotech-censured-for-false-claim-on-gilead-s-virus-drug>; and Joe McDonald and Linda A. Johnson, “Chinese Scientists Ask for Patent on U.S. Drug to Fight Virus,” *Associated Press*, February 6, 2020, <https://apnews.com/1fe943717b56b56cce5e733790f016dd>.

¹⁴⁴ Reuters, “Jointown Pharmaceutical To Issue Up To 1.5 Bln Yuan Worth of Renewable Bonds,” March 4, 2020.

¹⁴⁵ “Vision and Actions on Jointly Building the Silk Road Economic Belt and 21st Century Maritime Silk Road,” National Development and Reform Commission, Ministry of Foreign Affairs, and the Ministry of Commerce, March 28, 2015, https://reconasia-production.s3.amazonaws.com/media/filer_public/e0/22/e0228017-7463-46fc-9094-0465a6f1ca23/vision_and_actions_on_jointly_building_silk_road_economic_belt_and_21st-century_maritime_silk_road.pdf.

¹⁴⁶ Li Yan, “Xi Says China to Send More Medical Experts to Italy,” *Xinhua*, March 17, 2020, <http://www.ecns.cn/m/news/politics/2020-03-17/detail-ifzunmih1236562.shtml>.

¹⁴⁷ James Kraska, “China is Legally Responsible for COVID-19 Damage and Claims Could be in the Trillions,” *War on the Rocks*, March 23, 2020, <https://warontherocks.com/2020/03/china-is-legally-responsible-for-covid-19-damage-and-claims-could-be-in-the-trillions/>.

Technology, Co., Ltd. (YMTC), China's national champion to develop memory chips. YMTC is located in eastern Wuhan. The government saw continued operations as an issue of national security and issued special local and central government dispensation to keep the facility operational amidst the outbreak.¹⁴⁸ Separate reports indicate that HiSilicon—the semiconductor subsidiary of China's leading telecommunications equipment company Huawei—also sustained operations during the outbreak.¹⁴⁹

Issues for Congress

Congress faces choices that will affect not only the current situation, but also the longer-range U.S. trade and economic trajectory vis-a-vis China, with a potentially significant impact on the global economy as well. The outbreak of COVID-19 prompted a sharp collapse of transportation, services, and manufacturing production—including supply shortages of essential medical and health care products needed to contain COVID-19. The COVID-19 pandemic also precipitated a sharp downturn in global demand. Questions already brewing since the imposition of U.S. Section 301 tariffs have been intensifying congressional concerns and debates about potential short-term and long-term steps to address U.S. supply chain dependence on China for critical products, and the potential ramifications of these dependencies. These ramifications could be particularly marked in times of crisis or of PRC nationalization of industry. At the same time, some U.S. companies and Members of Congress have been calling for lowering tariffs on goods from China. The urgent need for pharmaceutical and medical supplies fueled systemic market pressures to increase U.S. reliance on China trade because China is an important source of many of these critical inputs and products. Whether and on what terms the Chinese government might be willing to export medical supplies to the United States remains uncertain.

Dependency of U.S. Health Care Supply Chains on China

The experience of shortages of critical medical supplies in the United States exposed U.S. health care dependencies on China. As China positions its industries to realize its MIC 2025 goals in biotechnology, pharmaceuticals, and medical equipment, the Chinese government is pursuing industrial policies to advance into higher positions in the global industrial value chain, raising questions about what this might portend for U.S. reliance on China as an increasingly competitive supplier.

As China's manufacturing capacity has come back online while the United States and other major global markets continue to grapple with COVID-19, the Chinese government appears to have selectively released medical supplies for overseas delivery. China appears to have selectively designated countries, at least to some extent (although the precise degree cannot be determined), according to political calculations and played up its role in Chinese state propaganda, as evidenced with China's deliveries to Italy and Serbia.¹⁵⁰ Most foreign governments appear to

¹⁴⁸ Cheng Ting-Fang and Lauly Li, "China Lets Wuhan Tech Plants Bypass Lockdown to Stay Open," *Nikkei Asian Review*, March 4, 2020, <https://asia.nikkei.com/Spotlight/Coronavirus/China-lets-Wuhan-tech-plants-bypass-lockdown-to-stay-open>.

¹⁴⁹ "Huawei, Chinese Chip Makers Keep Factories Humming, Despite the Virus," *Reuters*, February 2, 2020, <https://www.reuters.com/article/us-china-health-tech-huawei/huawei-chinese-chip-makers-keep-factories-humming-despite-virus-outbreak-idUSKBN1ZX0CX>.

¹⁵⁰ Li Yan, "Xi Says China to Send More Medical Experts to Italy," *Xinhua*, March 17, 2020, <http://www.ecns.cn/m/news/politics/2020-03-17/detail-1fzunmih1236562.shtml934157.shtml>; Reuters, China sends Serbia help to halt coronavirus spreading," March 21, 2020.

have paid for these supplies although a small subset of packages may have been aid. There also have been reports by other countries that some of China's medical supplies and testing kits were faulty.¹⁵¹ In a sign that China might have used the crisis to push substandard products or gain market share in developed markets over traditional U.S. suppliers based in China that produce for export, PRC state propaganda blamed shortages in March 2020 on alleged FDA failures to certify Chinese products for import.¹⁵² This raises the question of why products made by U.S. firms in China that are already FDA certified were not first in line for export to the United States given that these firms also expanded capacity during the crisis in China. Several prominent U.S. companies, including 3M, indicated in the early stages of the United States' COVID-19 outbreak that they did not have PRC government authorization to export.¹⁵³

In this environment, Congress faces choices about how best to incentivize production of health supplies in the United States, potentially in collaboration with other countries, to counter COVID-19 and future pandemics, and/or whether to impose any conditions on this production. In addition to a focus on lower-value items such as PPE, Congress might focus on ways to sustain U.S. industrial leadership in advanced medical equipment and pharmaceutical innovation. With an eye to China's industrial policies, Congress may also consider the potential longer-term advantages and disadvantages of diversifying U.S. supply and on-shoring of certain capabilities. Congress may also want to consider potential collaboration with like-minded countries, and ways to counter the effects on lesser-developed economies that could be hit particularly hard by the COVID-19 pandemic. China is likely to seek to retain the medical market share and edge it gains through the COVID-19 pandemic, particularly as these gains help advance China's MIC 2025 industrial policy goals in biotechnology, pharmaceuticals, and medical equipment. At the same time, the United States and other countries may seek to diversify away from China because of vulnerabilities highlighted during the outbreak. Nascent proposals to diversify away from China concerns and risks—such as UK Prime Minister Boris Johnson's suggestion of a D-10 alliance and the U.S. government's Clean Network strategy—advocate for closer trading ties among like-minded countries in sensitive technologies and sectors.¹⁵⁴

Recent legislative action related to these issues in the 116th Congress includes the following:

- P.L. 116-136, The Coronavirus Aid, Relief, and Economic Security (CARES) Act includes several provisions that expand drug shortage reporting requirements to include APIs and medical devices. The bill also requires certain drug manufacturers to draw up risk management plans and requires the FDA to maintain a public list of medical devices that are determined to be in shortage. Additionally, the bill directs the National Academies of Science, Engineering, and Medicine to conduct a study of pharmaceutical supply chain security. The CARES Act also waives certain congressional oversight and reporting requirements under the Defense Production Act of 1950's (DPA; 50 U.S.C.

¹⁵¹ Wendy Wu, "Coronavirus: Don't Politicize Medical Supply Problems, China Says," *South China Morning Post*, March 30, 2020, <https://www.scmp.com/news/china/diplomacy/article/3077537/coronavirus-chinas-ambassador-closely-following-netherlands>.

¹⁵² "Barriers Should be Removed to Send Medical Supplies to US," *Global Times*, March 24, 2020, <https://www.globaltimes.cn/content/1183647.shtml>.

¹⁵³ Keith Bradsher and Liz Alderman, "The World Needs Masks. China Makes Them—But Has Been Hoarding Them," *The New York Times*, March 16, 2020, <https://www.nytimes.com/2020/03/13/business/masks-china-coronavirus.html>.

¹⁵⁴ Lucy Fisher, "Downing Street Plans New 5G Club of Democracies," *The Times*, May 29, 2020 and Aaron Friedburg, "The United States Needs to Reshape Global Supply Chains," *Foreign Policy*, May 8, 2020, and "The Clean Network Safeguards America's Assets," U.S. Department of State Fact Sheet, August 11, 2020.

§§4501 et seq.) Title III Expansion of Productive Capacity and Supply, which governs purchases and loans made by the federal government to expand productive capacity in promotion of national defense, broadly defined.

- H.R. 8406, The Heroes Act, would introduce additional reporting requirements for drug manufacturers that obligate them to report drugs that are vulnerable to supply chain risks that could lead to shortages, and would introduce new penalties for failing to report. The bill would also introduce measures to strengthen U.S. competitiveness in advanced pharmaceutical manufacturing by enhancing the advanced manufacturing programs of the FDA and creating a new supply chain flexibility manufacturing pilot program. The bill would also encourage more research into ways to enhance domestic production of critical APIs and certain finished dosage drugs by designating certain research universities as “National Centers of Excellence in Continuous Pharmaceutical Manufacturing.” The Heroes Act was originally introduced as H.R. 6800 and was passed by the House on May 15, 2020; an updated version of the bill (H.R. 8406) was introduced on September 29, 2020.
- H.R. 7856, The Intelligence Authorization Act for Fiscal Year 2021, would also require ODNI to submit an additional report detailing China’s regulatory practices governing pharmaceutical and PPE manufacturing, as well as an estimate of the total percentage of APIs produced globally that originate in China.
- S. 4324, The Restoring Critical Supply Chains and Intellectual Property Act, contains multiple provisions that aim to re-shore supply chains across a range of sectors critical to public health and national security. Measures in the bill include a 30% investment tax credit for qualified manufacturers of medical PPE, stricter domestic purchasing requirements for the Strategic National Stockpile maintained by HHS, a new grant program to incentivize U.S. domestic production of advanced semiconductor chips, and funding for a new program to identify critical mineral supplies and address gaps in critical mineral supply chains.
- S. 3538 and H.R. 6393, The Strengthening America’s Supply Chain and National Security Act, would require companies to report on the sources of their APIs and would tighten laws encouraging the U.S. Department of Veterans Affairs to buy American pharmaceuticals. The bill calls for federal financing guarantees to U.S. medical supply companies with production in the United States and would increase the tax deduction temporarily for businesses investing in medical equipment and facilities related to COVID-19.
- S. 3343 and H.R. 6049, The Medical Supply Chain Security Act, calls for enhanced security of the medical supply chain and enhanced FDA authority to request information about the sources of drugs and medical devices. It would require medical device manufacturers to report expected shortages to the FDA.
- S. 3635 and H.R. 6482, The Protecting Our Pharmaceutical Supply Chain from China Act of 2020, would require the FDA to establish a registry to track APIs and institute a country-of-origin label for imported drugs. The bill would provide economic incentives for producing pharmaceuticals and medical equipment in the United States. The bill also would prohibit federal agencies and health

facilities from purchasing APIs and other pharmaceutical products manufactured in China without an FDA waiver certifying that China is the sole source.¹⁵⁵

- H.R. 6731, The Securing America's Pharmaceutical Supply Chain Act, would require executive agencies to restrict purchases of pharmaceuticals to drugs "over 50 percent sourced, manufactured, and assembled in the United States." The bill would also direct USTR to modify U.S. product coverage under all free trade agreements and the WTO Government Procurement Agreement (GPA) to exclude coverage of essential medicines and certain medical products.
- H.R. 5982, The Safe Medicine Act, would direct HHS to assess vulnerabilities in the U.S. pharmaceutical supply chain by issuing a report that examines U.S. dependence on China for critical APIs and gaps in domestic pharmaceutical manufacturing capabilities.
- H.R. 6386, The No Chinese Handouts In National Assistance (CHINA) Act, would prohibit any funds made available in appropriations acts for FY2020 from being used to compensate any individual or business controlled by the Chinese government. The act adopts the definition of government control established in Section 721(a) of the Defense Production Act of 1950 (50 U.S.C. §4565(a)).
- H.R. 4710, The Pharmaceutical Independence Long-Term Readiness Reform Act, would direct the Department of Defense to include a section in each national defense strategy that outlines steps to address gaps in the U.S. pharmaceutical manufacturing base and strengthen pharmaceutical supply chains with single points of failure.

Several Members of Congress also have introduced bills to amend certain provisions under the Defense Production Act of 1950 (DPA; 50 U.S.C. §§4501 et seq.) and ease its implementation. S. 4050, the Public Health Emergency Production Act of 2020 (PHEPA) would create an office in HHS with responsibility for a variety of DPA responsibilities, including a freestanding DPA Title III office, which would be led by an official at the rank of Deputy Assistant Secretary. Some Members have also introduced several resolutions in the House and Senate that call on the President to use DPA authorities to facilitate the production of medical supplies. H.R. 6395, the National Defense Authorization Act for Fiscal Year 2021 as passed by the House, for example, contains provisions that would expand the definition of health resources critical to national security to include PPE and COVID-19 testing equipment. S. 4339 and H.R. 7836, the Masks for All Act of 2020, would direct FEMA to, among other things, use the DPA to provide for the manufacture and distribution of face masks for every individual in the United States in response to the COVID-19 pandemic. Despite recent legislation to spur PPE production and concerns by expressed by some Members of Congress over the supply of available PPE, the Trump Administration has not consistently used DPA authorities to expedite PPE contracts.¹⁵⁶ In an effort to address the ambiguity of the Administration's response, several Members of Congress have introduced legislation such as H.R. 6390 and S. 3568 that would require the President to use authorities under the DPA to require emergency production of medical equipment to respond to the COVID-19 outbreak.

¹⁵⁵ An earlier version of S. 3635 was introduced in the 116th Congress as S. 3537.

¹⁵⁶ For recent developments in the use of DPA to procure medical supplies, see CRS Insight IN11470, *Defense Production Act (DPA): Recent Developments in Response to COVID-19*, by Michael H. Cecire and Heidi M. Peters; for an in-depth discussion of DPA history and authorities, see CRS Report R43767, *The Defense Production Act of 1950: History, Authorities, and Considerations for Congress*, by Michael H. Cecire and Heidi M. Peters.

In addition to legislation introduced by Members of Congress, the Trump Administration drafted an Executive Order in mid-March 2020 that seeks to increase U.S. production capacity while eliminating loopholes that have allowed the U.S. government to buy pharmaceuticals, PPE, and ventilators from overseas.¹⁵⁷ Released on August 6, 2020, this Executive Order 13944 mandates that federal agencies “conduct the procurement of Essential Medicines, Medical Countermeasures, and Critical Inputs by: using procedures to limit competition to only those Essential Medicines, Medical Countermeasures, and Critical Inputs that are produced in the United States; and dividing procurement requirements among two or more manufacturers located in the United States, as appropriate.” Additionally, the order requires USTR to “take all appropriate action to modify United States federal procurement product coverage” under the WTO Agreement on Government Procurement and other relevant trade agreements. The Executive Order also calls for the HHS Secretary to identify U.S. supply chain vulnerabilities for essential medicines, medical capabilities, and critical inputs within 180 days of the issuance of the Executive Order. HHS is called to streamline requirements and accelerate certain applications. The Executive Order also calls for federal agencies to provide detailed procurement details for the prior three years by no later than December 31, 2021, and annually thereafter.¹⁵⁸ The Administration also took steps to increase funding for U.S. API production capacity for critical medicines. These steps included awarding a \$354 million contract to a corporation in Richmond, Virginia, and a \$765 million loan to Eastman Kodak to develop API production capacity.¹⁵⁹

Other U.S. Supply Chain Dependencies

The COVID-19 pandemic has provided a direct learning experience about the effects and costs of a serious disruption or cutoff of critical supplies from China to the United States. Key broader questions facing the United States that have serious implications for future economic and trade relations include

- What are the consequences for U.S. interests when China nationalizes production and distribution and hardens its borders as it did during the COVID-19 crisis?
- What happens if Chinese government planners corner global supply alternatives?
- What happens if the United States hardens its own borders?
- What happens if U.S. allies and partners are in crisis and turn to national tools and approaches?
- What supply lines are available to the United States?
- What is current baseline U.S. production capacity and what is U.S. production capacity in the event an Administration invokes the Defense Production Act (DPA)?
- What control do chief executive officers of U.S. companies or the U.S. government have over U.S. corporate facilities and operations that are nationalized in China?

¹⁵⁷ “White House Working on Order to Cut U.S. Dependency on Foreign Medicines,” Reuters, March 16, 2020.

¹⁵⁸ Executive Order 13944, “Combating Public Health Emergencies and Strengthening National Security by Ensuring Essential Medicines, Medical Countermeasures, and Critical Inputs Are Made in the United States,” 85 *Federal Register* 49929, August 6, 2020.

¹⁵⁹ U.S. International Development Finance Corporation, “DFC to Sign Letter of Interest for Investment in Kodak’s Expansion Into Pharmaceuticals,” press release, July 28, 2020; U.S. Department of Health and Human Services, “HHS, Industry Partners Expand U.S.-Based Pharmaceutical Manufacturing for COVID-19 Response,” press release, May 19, 2020.

- What are U.S. dependencies on China in other critical areas such as microelectronics?

U.S. Market Competitiveness and Tariff Policy

Congress faces a series of interrelated questions about whether and how to calibrate trade policy to best position the United States in the current crisis and beyond. In response to a U.S. investigation of China's unfair trading practices under Section 301, since 2018, the United States has imposed a series of tariffs and China has responded with a series of counter tariffs that now affect a majority of trade between the two countries. Temporary tariff relief for medical supplies and pharmaceuticals could incentivize imports for the United States and other markets, but tariff policy cannot address the deeper issues of supply shortages, export constraints imposed by a number of countries including China, and product certification requirements in the United States and other markets. Tariff liberalization has been insufficient to address industrial policies within borders such as regulatory standards, procurement terms, and local content requirements that China and others impose in a range of sectors including pharmaceuticals and medical equipment.¹⁶⁰

Actions by countries around the world to impose export barriers during the pandemic highlight potential gaps and limits to the power of WTO rules prohibiting export bans during times of global crisis. These actions also raise questions about what new rules or protocols might be needed in the future.¹⁶¹ Liberalization of U.S. import requirements may have also created some of the challenges the United States is facing now, such as loosening the requirements for U.S. pharmaceutical firms to report on shortages and how they classify imported content for finished products that qualify as U.S. products. The potential for China to overwhelm global markets as it leans on exports for economic recovery raise questions about whether additional policy measures might be needed. Rather than waiting until market injury has already occurred to seek damages, for example, Congress may want to be watching trade patterns for signs of import surges and oversee the Administration's potential use of safeguard measures. Similar to the Australian government's decision on March 29, 2020 to impose new temporary restrictions on all foreign investment proposals out of concern that strategic investors—particularly those of Chinese origin—might target distressed assets, Congress may want to carefully monitor these trends.

Information and Data Gaps

The outbreak of COVID-19 exposed gaps in U.S. understanding of U.S. domestic competencies and dependencies on China and other sources of global supply. Vulnerabilities regarding raw materials, such as APIs, are not well recorded in trade and industry data. They are particularly complicated to track when materials are shipped from China and processed in a third market such as India. In similar fashion, the United States has relaxed definitions of what qualifies as a U.S. product with imported content, masking the extent to which domestically produced products may still rely on inputs from overseas. Pharmaceutical company stockpiles are proprietary, and companies do not have to report on reserves. They are only required to report when they have a

¹⁶⁰ Jennifer A. Hillman, "Six Proactive Steps in a Smart Trade Approach to Fighting COVID-19," ThinkGlobalHealth, March 20, 2020, <https://www.thinkglobalhealth.org/article/six-proactive-steps-smart-trade-approach-fighting-covid-19>
Anabel Gonzalez, "A Memo to Trade Ministers on How Trade Policy Can Fight COVID-19," PIIIE, March 23, 2020, <https://www.piie.com/blogs/trade-and-investment-policy-watch/memo-trade-ministers-how-trade-policy-can-help-fight-covid>.

¹⁶¹ See CRS In Focus IF11551, *Export Restrictions in Response to the COVID-19 Pandemic*, by Christopher A. Casey and Cathleen D. Cimino-Isaacs.

shortfall, which does not leave enough time, particularly in times of emergency, for national and contingency planning.

Under the International Investment Survey Act of 1976 (22 U.S.C. §3101 et seq.), the President has wide authority over the collection of corporate activity abroad for statistical and analytic purposes. The act also confers on the President the authority to request mandatory surveys of companies under specific deadlines with the ability to invoke civil and criminal penalties for noncompliance. The President has the authority to study the adequacy of current information and recommend improvements, and the act requires him to report to Congress.¹⁶²

To address these issues, Congress could consider whether to request the President to invoke his authority over the U.S. government's collection of data on corporate activity abroad. These corporate surveys could obtain specific supply chain information about the status of PPE and medical supply production, distribution, and export policy situation facing U.S. companies overseas, including in China. The surveys also could cover other sectors of potential congressional concern. This information could inform legislation that Congress has already passed or is considering with regard to overseas supply chains, including sourcing from China.

The COVID-19 pandemic highlighted potential limitations in the U.S. medical product supply chain, including concerns that many raise about U.S. reliance on foreign manufacturers and a lack of transparency and diversification in key areas. Some Members of Congress have raised concerns regarding gaps in U.S. Government's understanding of U.S. domestic competencies and dependencies on China and other sources of global supply.¹⁶³

Possible vulnerabilities regarding raw materials and inputs, such as active pharmaceutical ingredients (APIs), are not well recorded in official trade and domestic industry data. They might be particularly difficult to track if they originate in one country but are subsequently processed in another. In addition, the United States has relaxed definitions of what qualifies as a U.S. product with imported content, which may mask the extent to which domestically produced products rely on foreign inputs.¹⁶⁴

The Coronavirus Aid, Relief, and Economic Security (CARES) Act (P.L. 116-136) included a provision that aims to address some of these gaps by requiring producers to report to the U.S. Food and Drug Administration (FDA) the amount of drugs manufactured for domestic distribution.¹⁶⁵ Some Members have also introduced legislation that would require the U.S. government to review and report on the origin of pharmaceuticals sold in the United States and the role that foreign manufacturing plays in medical supply chains. Other congressional proposals would require drug makers to report on reserves, since requiring them to do so only when they

¹⁶² <https://uscode.house.gov/view.xhtml?path=/prelim@title22/chapter46&edition=prelim>; and "Legal Authority and Confidentiality of International Survey Collections," U.S. Bureau of Economic Analysis, <https://www.bea.gov/about/legal-authority-and-confidentiality-international-survey-collections>.

¹⁶³ U.S. Congress, Senate Committee on Homeland Security and Governmental Affairs, Evaluating the Federal Government's Procurement and Distribution Strategies in Response to the COVID-19 Pandemic, hearing, 116th Cong., 2nd sess., June 9, 2020.

¹⁶⁴ The lack of statutory definitions of various terms (e.g., "manufactured" in the United States) may yield different determinations for the same product. Moreover, the "substantial transformation" test used by U.S. Customs and Border Protection (CBP) to determine a product's country of origin for trade purposes is complex, fact-specific, and thus inherently subjective in nature.

¹⁶⁵ For more detail, see CRS Report R46628, *COVID-19 and Domestic PPE Production and Distribution: Issues and Policy Options*, coordinated by Michael H. Cecire.

have shortages may not leave enough time, particularly in times of emergency, for national and contingency planning.

Some Members have also introduced legislation that would require the U.S. government to review and report on the origin of pharmaceuticals sold in the United States and the role that foreign manufacturing plays in medical supply chains.¹⁶⁶ Other congressional proposals would require drug makers to report on reserves, since requiring them to do so only when they have shortages that may not leave enough time, particularly in times of emergency, for national and contingency planning. Members of Congress also tasked the U.S. International Trade Commission (ITC) with conducting an analysis of COVID-19 related supply chains (see **text box**).

**U.S. International Trade Commission's Investigations Related to COVID-19:
Market, Trade, and Supply Chain Challenges**

On April 6, 2020, the Chairs of the House Committee on Ways and Means and the Senate Committee on Finance requested that the U.S. International Trade Commission (USITC) identify imported goods related to the response to the COVID-19 pandemic, their source countries, tariff classifications, and applicable rates of duty. To assist the Committees and the U.S. Trade Representative (USTR) in proposing or taking appropriate and responsive actions, the Chairs asked that the USITC issue a report by April 30, 2020. The USITC released its report, "COVID-19 Related Goods, US Imports and Tariffs," to the public on May 4, 2020, and updated it on June 30, 2020, which provided trade-related information for the products identified, and tabulated U.S. import data from 2017, 2018, and 2019. Subsequently, on August 13, 2020, the Committees requested a follow-on investigation. The USITC was also asked to publish a report that builds on the earlier investigation and provide more detailed information on COVID-19 related industry sectors and particular products identified in the Commission's previous report.

The latest report, "COVID-19 Related Goods: The U.S. Industry, Market, Trade, and Supply Chain Challenges," was released on December 22, 2020. It assesses "the availability of goods from the onset of the COVID-19 pandemic through September 2020, provides overviews of four key industry sectors (medical devices, personal protective equipment, pharmaceuticals, and soaps and cleaning compounds)... [and] includes case studies on ventilators, N95 respirators, surgical masks, surgical and isolation gowns, medical and surgical gloves, test kits, vaccines, and hand sanitizer."¹⁶⁷ The study concludes, among other things, that U.S. domestic industries faced challenges in ramping up production to meet growing demand and that the extent of domestic production varied significantly. In particular, U.S.-based producers' share of the domestic market was relatively small for certain PPE such as medical gloves and gowns, but large for goods like ventilators, vaccines, N95 respirators, and hand sanitizer. According to the findings, major factors affecting domestic production of COVID-19 related goods include the availability and costs of inputs, the time and cost of bringing additional production capacity online, and the time needed to recruit and train new workers. Finally, because global demand significantly exceeded available supply of many COVID-19 related goods, it was difficult for U.S. importers to procure PPE in sufficient quantities.

While there may not be a single legislative solution to measure and manage supply chain dependencies and risks, Congress could consider authorizing federal agencies to collect more data on individual firms' activities in the United States and abroad. In the past, Congress has taken similar steps to monitor U.S. investment abroad and foreign investment in the United States (see 22 U.S.C. §§ 3101-3108). Agencies could obtain, analyze, and report specific supply chain information about the status of PPE and medical goods production and distribution without disclosing business confidential information that could seriously prejudice firms' interests. Surveys also could help assess the overall production capabilities of U.S.-based producers in industries or sectors of congressional concern.

¹⁶⁶ See, for example, S. 3537 (116th Congress).

¹⁶⁷ U.S. International Trade Commission, "USITC Releases Report Concerning the U.S. Industry, Market, Trade, and Supply Chain Challenges for COVID-19 Related Goods," December 22, 2020; and "COVID-19 Related Goods: The U.S. Industry, Market, Trade, and Supply Chain Challenges," Investigation No. 332-580, USITC Publication 5145, December 2020.

Alternatively, Congress could direct some agencies to collect data on federally owned public and defense stockpiles of certain items. While this would be a more targeted effort, it might be easier to manage and provide comprehensive data far more quickly and at less expense to the government. This information could inform legislation that Congress has already passed or is considering with regard to domestic production and overseas supply chains, including sourcing from China.

Unique Role of the U.S. Federal Government

At a time when U.S. health care systems, states, and countries overseas seek to secure limited medical supplies, the U.S. federal government has a unique role to play in ensuring adequate domestic and global production, contracting of supply (both domestically and globally), and distribution of these resources. Even as new capacity might be available in China, for example, who are the U.S. actors positioned to try to secure this supply and through what pathways? Lack of coordination at the federal level has led states to scramble and compete against each other for critical medical supplies in the current crisis.¹⁶⁸ Among the key questions related to these issues, Congress may explore answers to such questions as

- How does the U.S. federal government position itself vis-a-vis U.S. state and private actors?
- How does the U.S. federal government position itself vis-a-vis other foreign governments trying to secure similar supplies?
- What is the U.S. government's posture toward supplies needed in the developing world?
- How might expanded production capacity created in the United States not only help the U.S. market but also those of other countries, in the near term and over the longer term?

U.S. Leadership on Global Medical Trade

The COVID-19 pandemic has provided a unique opportunity to reaffirm U.S. global leadership on trade and health issues and to counter China's nationalization and likely politicization of its domestic medical supply production capacity. China's export restraints and cornering of the global supply of medical products ahead of others in February 2020 have created strains on the open trade system, further incentivizing other countries to close borders and restrict any access to supplies they may have. These moves also have given China market power over other countries' procurement decisions as governments around the world grapple with how best to secure critical supplies. Early signs showed that China closely controlled and released supplies to other governments through contracts and some aid in ways that sought to improve China's global image and may have come with other quid pro quo terms that are not yet visible. China's economic recovery ahead of others could further challenge and undermine key tenets of the open trade system, particularly if China exports pent up domestic capacity with a disregard for what the current state of the global economy is prepared to absorb on market terms.

¹⁶⁸ For further discussion of these issues also see, "COVID-19: Federal Efforts Could Be Strengthened By Timely and Concerted Actions," GAO Report to Congressional Committees, GAO-20-701, September 21, 2020, <https://www.gao.gov/reports/GAO-20-701/>.

While some European countries imposed export restraints on their health supplies, some politicians in Europe have expressed concern about how the Chinese government manipulated the crisis and China's position in global supply chains for political gain.¹⁶⁹ Some analysts have expressed concern that China has been trying to position itself as a responsible global leader in health, while violating the core tenets of WHO membership in failing to share critical information and access in the critical first few weeks as the crisis emerged in Wuhan. Members concerned about maintaining U.S. global economic leadership during the COVID-19 pandemic may consider using hearings, legislation, and statements to communicate key issues to be addressed.

Possible questions for Congress in the context of COVID-19 include

- whether to prioritize economic openness and free flows of information;
- whether to prioritize diversifying sources of medical supplies, and if so, how;
- how best to overcome current and future bottlenecks in health care supply chains in the United States and partner nations;
- whether to respond to China's attempts to control the global narrative about key COVID-19 events, and if so, how; and
- whether to look to reform global health and trade governance in light of COVID-19 developments, and if so, how.

Some Members have questioned the role of China and the WHO during the initial COVID-19 outbreak and have been raising questions about the need to reform global health governance. Other Members have looked to set a clear chronology of events in the COVID-19 outbreak to maintain an accurate record that is not distorted by Chinese state propaganda. Some Members have been looking at the social media platforms that the Chinese government uses to convey state propaganda—such as Twitter—and have raised questions about whether this access should be allowed. Several Members have expressed an interest in potential measures to hold China accountable for its slowness to acknowledge, address, and share information regarding the outbreak of COVID-19 as required by WHO members.

¹⁶⁹ “The Coronavirus and the New World it is Creating,” European Union External Action Office, March 23, 2020, https://eeas.europa.eu/headquarters/headquarters-homepage_en/76379/The%20Coronavirus%20pandemic%20and%20the%20new%20world%20it%20is%20creating.

Appendix. U.S. Imports of Select Medical Products

Table A-1. U.S. Imports of Pharmaceuticals and Medical Equipment, Products, and Supplies in 2019

Economy	Value (US\$)
Ireland	35,797,919,666
Germany	25,416,992,979
China	20,744,036,029
Switzerland	19,115,982,191
Mexico	15,758,366,376
Italy	9,356,424,042
Canada	9,072,982,790
India	8,325,151,620
Japan	8,126,636,035
Singapore	7,947,308,765
Rest of the World	64,911,471,228
Total	\$224,573,271,721

Sources: CRS using the World Customs Organization’s “HS Classification Reference for COVID-19 Medical Supplies”; Gary Clyde and Jeffrey J. Schott’s “List of Pharmaceutical and Medical Device Products by Harmonized System (HS) Code” in *Local Content Requirements: A Global Problem*; and Chad Bown’s “Trump’s Trade Policy Is Hampering the U.S. Fight Against COVID-19.” Data sourced from the U.S. International Trade Commission’s DataWeb and Global Trade Atlas.

Note: The figures presented here cover product categories at the HTS six-digit level.

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Exhibit

7

The Economic Impact of the COVID-19 Pandemic: Quantifying the Damages to the Missouri Economy

A report by

Joseph H. Haslag, PhD

Executive Summary

Beginning in March 2020, the SARS-CoV-2 virus and the pandemic that followed significantly affected economic activity in the United States. The key feature is March 11, 2020. After that date, the facts indicates that the SARS-CoV-2 virus spread widely across the United States, resulting in efforts to control the spread, including masks, business shutdown, and employment losses. According to Paragraph 6 of the Petition, the Defendants—the Peoples Republic of China—in violation of their duties to the international community, engaged in dangerous activities that imperiled the lives and health of millions. Paragraph 15 goes on to state that: “As a sovereign State, Missouri has ‘a quasi-sovereign interest in the health and well-being—both physical and economic—of its residents in general.’ ”

The purpose of this report is to quantify the economic damages suffered by the citizens of the State of Missouri and the State of Missouri Government due to the outbreak of the diseases caused by the SARS-CoV-2 virus.

The findings are summarized as follows:

- The economic impacts are divided into contemporaneous effects and future effects. The contemporaneous effects are captured by comparing the actual path of real GDP in Missouri with the control path constructed “as if” the SARS-CoV-2 virus had not occurred. The difference between the two paths is the quantitative measure of the impact that the pandemic had between March 2020 and May 2023.
- SARS-CoV-2 also affected future economic activity by hindering education. There is evidence from standard tests that math and reading attainment was close to one-half year because of the disruptions to K-12 education. The University of Pennsylvania projects the impacts on labor productivity between 2021 and 2051. The projected labor productivity growth losses are applied to control path for Missouri real GDP from 2023 through 2051.
- For the contemporaneous economic damages, the cumulative sum of Missouri GDP losses is \$23.21 billion during the period 2020 Q1 and 2023 Q2.
- For the future economic damages, the cumulative, discounted sum of GDP losses in Missouri are \$480.24 billion between 2024 and 2051. Thus, the total economic damages to the State of Missouri are \$503.4 billion between 2020 and 2051.
- Research conducted by University of Southern California report contemporaneous economic damages for the United States. Based on the University of Southern California estimates, the share of the Missouri economic damages are equal to \$216.42 billion between 2020 and 2024.
- The dollar value of economic damages is calculated to be \$503,446,370,000. If we use the estimates from the University of Southern California, the total economic damages would be \$696,658,620,000. Real GDP serves as the tax base for the State of Missouri. Because of the economic damages, the State of Missouri General Fund would be no less \$15.61 billion lower because of the SARS-CoV-2 virus. At the high end of the economic damages to the Missouri tax base, the foregone General Revenue Funds could be as high as \$21.6 billion.

Introduction

In the report, I offer an expert opinion on the economic damages in the case involving The State of Missouri (hereafter the Plaintiff) v. the People’s Republic of China, the Communist Party of China, the National Health Commission of the People’s Republic of China, the Ministry of Emergency Management of the People’s Republic of China, the Ministry of Civil Affairs of the People’s Republic of China, the People’s Government of Hubei Province, the People’s Government of Wuhan City, the Wuhan Institute of Virology and the Chinese Academy of Sciences (hereafter, the Defendants).

The case centers on transmission of the SARS-CoV-2 virus (hereafter Covid-19 virus) and the pandemic that followed. The key feature in the case occurs on March 11, 2020. According to Paragraph 6 of the Petition, the Defendants, in violation of their duties to the international community, engaged in dangerous activities that imperiled the lives and health of millions. Paragraph 15 goes on to state that: “As a sovereign State, Missouri has ‘a quasi-sovereign interest in the health and well-being—both physical and economic—of its residents in general.’ ”

The purpose of this report is to quantify the economic damages suffered by the citizens of the State of Missouri and the State of Missouri Government due to the outbreak of the diseases caused by the SARS-CoV-2 virus

The Facts

The Covid-19 pandemic affected economic activity across the world and over time. The World Health Organization (WHO) declared the start of the Covid-19 pandemic beginning March 11, 2020, and ending on May 5, 2023. The economic impacts were not limited to this period. As governments implemented actions to mitigate the spread of the disease, investments in human capital were also affected. Researchers at the University of Pennsylvania argued that reading and math achievement showed the equivalent of 0.4 years of schooling. Without correction, students in the 2020-21 academic year will be permanently affected. With education and future productivity positively correlated, the lost investment in human capital will affect economic activity for the remainder of these student's work lives.

The purpose of this report is to quantify the economic impact that the Covid-19 pandemic had on the State of Missouri economy. Two sets of calculations are performed. First, compute the economic impacts during the period of the pandemic. The idea is that the Missouri economy would have continued along its average trajectory. What actually transpired is an L-shaped recovery. The losses during the pandemic represent the difference between the measure of what would have happened (the Control) and what actually happened (the Treatment).

Second, the pandemic has impacts that persisted because of the effects on investment. In particular, human capital investment was affected with estimates that K-12 students lost approximately 0.4 of a school year to the pandemic. The post-pandemic effects are measured over the period from 2023 through 2051. Future losses are discounted to bring them to the value in 2023.

During the pandemic, the calculations indicate that the Missouri economy lost more than \$23 billion in GDP between 2020:Q1 and 2023:Q2. Between 2023 and 2024, the sum of discounted GDP losses in Missouri are projected to be over \$480 billion. Combined the projected GDP losses in Missouri are just over \$500 billion in 2023 inflation-adjusted dollars. In terms of lost revenues paid to the State of Missouri, the discounted sum of foregone revenues is equal to \$15.61 billion for the period 2020 through 2051.

Methods and Analysis

In this report, aggregate economic measures of real Gross Domestic Product (GDP) are the basis for comparing measures of what actually happened during and after the Covid-19 pandemic and what would have happened if no pandemic had occurred. By its encompassing nature and because it is measured in dollars (adjusted for inflation), GDP is the natural metric for quantifying the total impact of events, like the pandemic, on economic outcomes.

Since the 1930s, researchers have characterized economic outcomes as reflecting impulses and the subsequent propagation mechanisms. To illustrate, a pebble dropped into a pool of water is analogous to the impulse hitting the economy. Propagation describes how the waves move through the pool over time. In the pool, the propagation depends on how deep the pool, any rocks or underwater plants (frictions) that impede the waves. In an economy, frictions include legal restrictions and regulations, access to markets, hidden information or actions by market participants, along with a host of other factors.¹

For the purposes of this report, we identify the Covid-19 pandemic as the impulse that affected the Missouri economy. In addition to the immediate impact, the Missouri economy continued to be affected as the impulse propagated through the economy over time. To quantify the economic impact, we take the observed path of the Missouri economy From March 2020 forward as the Treatment effect; that is, we know what actually happened to the Missouri economy after the Covid-19 virus was introduced into the Missouri economy, at least through the end of 2023. To consider the Treatment effect after 2023, we rely on measures calculated from the Budget Model maintained at the University of Pennsylvania.²

In addition, we need a control path for the Missouri economy. Here, the term Control refers to a measure of what Missouri's GDP *would have been* without the impulse coming from the Covid-19 virus. In our setup, Control path is constructed as if the Missouri economy would have increased at its average annual growth rate. The underlying assumption is that impulses are, on average, not predictable. More precisely, the expected value is distributed with mean zero and constant variance. The actual draw from the distribution of impulses is not necessarily equal to zero. The point is that the expected value of the actual draw is equal to zero before it happens.

With the construction of the Control path and the Treatment path, the economic damages are the difference between the two. With Covid-19, we will see that Missouri's real GDP declines in response to the impulse. Over time, as the Covid-19 effects continue to propagate through the Missouri economy, we continue to see declines in Missouri's GDP relative to the Control path.

¹ It is outside the scope of this report to identify all the different frictions that operate in the economy. The use of impulse-propagation language can be traced back to a statistician and to an economist. For the interested reader, the statistician Yule, G. U. (1926), "Why do we sometimes get nonsense-correlations between time series?: A study in sampling and the nature of time series," *Journal of Royal Statistical Society*, 89, 1-64; and the economist, Frisch, R. (1933), "Propagation problems and impulse problems in dynamic economics," in *Economic Essays in Honor of Gustav Cassell*, London: Allen & Unwin, 171-205 independently came to the characterization that time series data can be characterized with the impulse-propagation analogy.

² There will be a detailed description and source presented in the section that describes the specific methodology used to construct the post-2023 Treatment effect.

1. Economic Damages

a. Damages during the pandemic

The first step is to compute the economic damages that affected the Missouri economy during the pandemic. The World Health Organization (WHO) declared the start of the pandemic identified as Covid-19 as March 11, 2020. The WHO declared the pandemic ended on May 5, 2023.

Thus, we measure the difference between Missouri's GDP Control path and its Treatment path for the period between March 2020 and May 2023. Because GDP is reported at quarterly frequencies, we focus on GDP starting in 2020 Q1 and ending in 2023 Q2. (Throughout this report, I adopt the notation shorthand: Q2 refers to the second quarter in the year.)

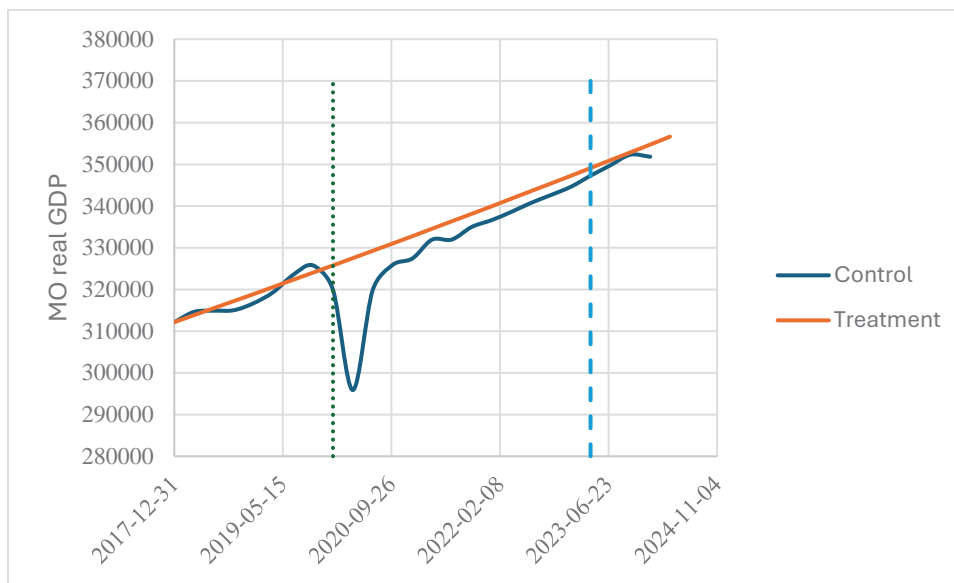
The Control path is constructed using the projected value of Missouri's GDP in the absence of any impulses during the 2020 Q1 through 2023 Q2 period. To calibrate the projected Control path, we use the average annual percentage change in Missouri GDP for the period 2018 Q1 through 2019 Q4. From these data, we see that the Missouri GDP increased at a 2.15 percent average annual rate. The Control path is initiated at \$312.18 billion which is the level observed in 2018 Q1. Figure 1 plots the observed (Treatment) and the projected (Control) path for Missouri GDP for the period 2018:Q1 through 2024:Q4. The two vertical lines represent the dates at which the Covid-19 pandemic started and ended.

From Figure 1, we see there was a small drop in Missouri GDP in the first quarter of 2020. As mitigation efforts were implemented, there is a sharp decline in the second quarter of 2020. By the third quarter of 2020, Missouri GDP is rebounding. It continues to approach the Control path from 2021 through 2023. In each quarter, the economic damage is measured as the vertical distance between the orange (Control) path and the blue (Treatment) path. Note that the data in Figure 1 are the quarterly values that have been annualized. To compute the quarter-by-quarter damages during the pandemic, we divide these annualized values by four.

Figure 2 has performed the conversion to lost Missouri GDP quarter-by-quarter. Based on these calculations, Missouri lost nearly \$1.5 billion in GDP during the first quarter of 2020. As the United States implemented more restrictions in order to mitigate disease spread, the lost GDP jumped in the second quarter of 2020, increasing to \$8 billion. It was not until the third quarter of 2021 that Missouri's lost GDP fell below \$1 billion. To obtain the cumulative sum of economic damages, we multiply each

Figure 1

Control and Treatment levels of Missouri GDP, 2018-2024



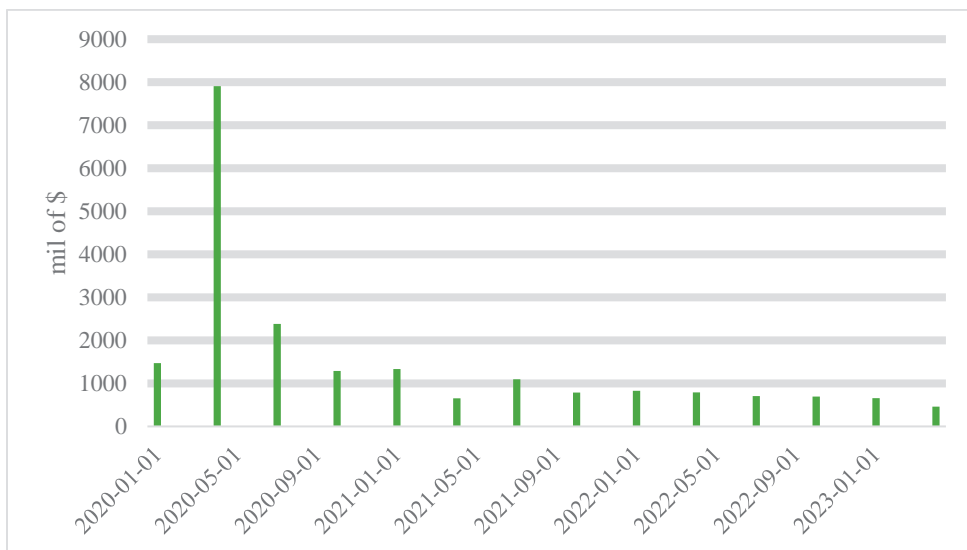
quarter’s value by the Treasury bill rate for each quarter between 2020 Q1 and 2023 Q2.³ We adjust the losses in Missouri real GDP suffered between 2020:Q1 and 2023:Q2. The adjustment could have been done using the average real return on a portfolio of investments. Instead, we use a very conservative return, which is the risk-free return on United States Treasury securities. The Treasury bill rate converts the current period GDP loss to what it would be worth—principal plus interest—in 2024 Q4. To illustrate, in 2022 Q3, the quarterly average annual return was 2.93 percent for Treasury securities maturing in 2024 Q4. With Missouri’s lost GDP equal to \$707.14 million (the principal) in 2022 Q3, I multiply the 2022 Q3 principal by the annual return raised to the power 2.25 because there is 2 years and one quarter between 2022 Q3 and 2024 Q4.

After adjusting for interest on the economic damages, the cumulative sum of Missouri GDP losses is \$23.21 billion during the period 2020 Q1 and 2023 Q2.

³ We obtained those data from the Federal Reserve Bank of St. Louis FRED database. The values are reported in the data appendix to this report.

Figure 2

Quarterly Value of Damages to Missouri GDP



b. Damages after pandemic

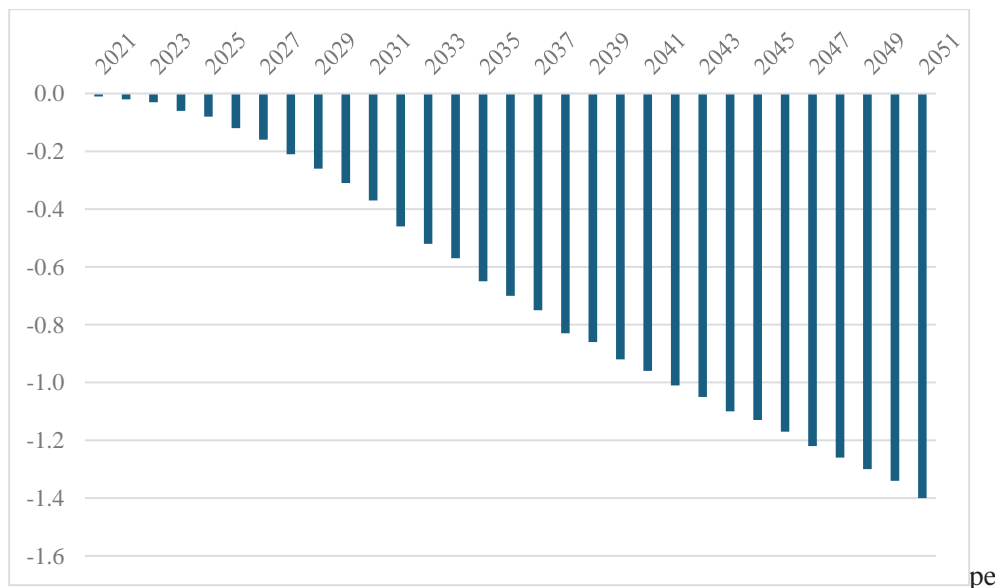
In order to mitigate the spread of Covid-19, government responses included measures that affected public education. The disruption to K-12 education is projected to impact future productivity. Consequently, measures of treatment effects after May 2023 are included.

To estimate the impact on future productivity, estimates are obtained from the Budget Model created at the University of Pennsylvania (hereafter the Penn Wharton model). Based on reading and math test scores, the Northwest Evaluation Association (NWEA) student learning gains during the 2020-21 school year.⁴ The Penn Wharton model converts the grade-specific achievement scores into a projected loss of effective years of schooling by comparing actual scores that would have been achieved without the disruption to K-12 education. The next step is to use estimates of the effects of years of education and future worker productivity. The Penn Wharton projections are that students lost roughly 0.4 school years of reading and math education during the 2020-21 school year.

With less effective school years, the Penn Wharton model projects the annual impacts on economic growth in the United States. Figure 3 plots the projected impact on real GDP growth for the period 2021-2051. The data show that the impacts are initially quite small—less than 0.1 percent—through 2025. The rationale is that only a few students will enter the workforce immediately after the 2020-21 school year.

⁴ See “COVID-19 Learning Loss: Long-run Macroeconomic Effects Update,” Penn Wharton Budget Model, University of Pennsylvania. The report can be found at [COVID-19 Learning Loss: Long-run Macroeconomic Effects Update — Penn Wharton Budget Model](#). The NWEA report can be found at [Learning-during-COVID-19-Reading-and-math-achievement-in-the-2020-2021-school-year.research-brief-1.pdf](#).

Figure 3



However, the projected losses increase over time due to two factors. First, number of workers affected will be completely absorbed into the workforce over time. Second, there is a compounding effect that owes to the productivity losses over time. Indeed, by 2051, the projected loss is 1.4 percent of GDP.

To estimate the future impacts on the Missouri economy, we apply the national projected percentage loss in real GDP to Missouri's future path of real GDP. We construct losses for the period 2023-2051. The Control path for Missouri's future real GDP is constructed by applying the average annual percentage change to the base year level of GDP in 2023.

$$Y_t^c = (1 + 0.0218) Y_{t-1}^c \quad (1)$$

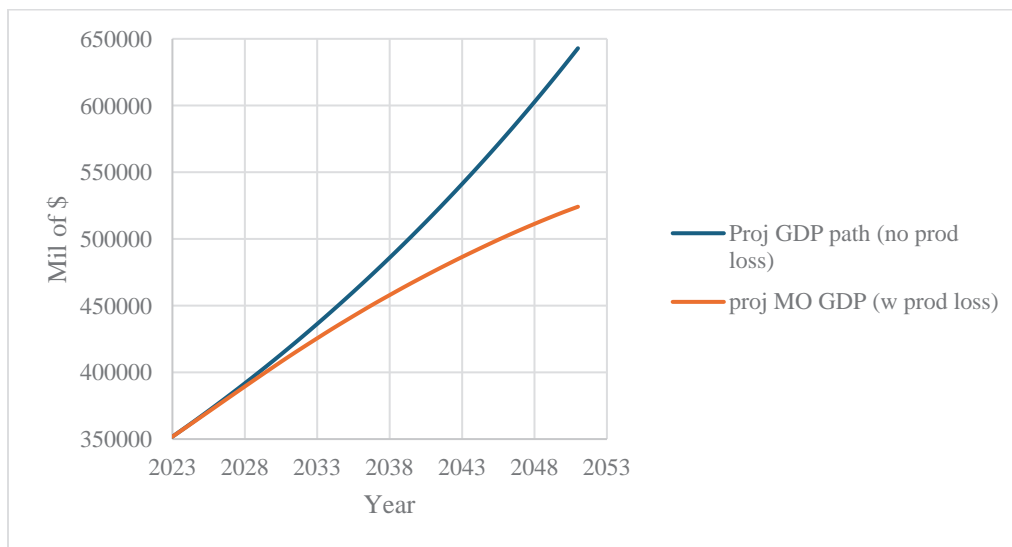
for $t = 2024, 2025, \dots, 2051$. Note that Y_{2023}^c is the initial value. Equation (1) starts with the assumption that Missouri real GDP increased at a 2.18 percent average annual rate from 2018 through 2023.

To construct the Treatment path, we modify equation (1) to take into account the percentage change in economic growth projected for each year by Penn Wharton model. Let l_t $t = 2024, 2025, \dots, 2051$ denote the economic growth rate loss in each year from 2024 through 2051. Next, subtract the projected GDP growth loss from 2.18 percent where l_t is taken from Figure 3. The result is the projected annual percentage change in Missouri real GDP. Formally, we write

$$Y_t^p = \left(1 + (0.0218 - l_t) \right) Y_{t-1}^p. \quad (2)$$

As we had in Equation (1), the initial value is Missouri real GDP in 2023. The economic impact is presented as the difference between the control value and the Treatment value for each year from 2024 through 2051. Figure 4 plots the two paths. By 2051, the difference is nearly \$120 billion a year.

Figure 4



If we simply accumulate the annual losses, the value is over \$1 trillion between 2024 and 2051. In order to compare future losses to the present value, I discount all future losses, using a discount rate of four percent.⁵ The cumulative, discounted sum of GDP losses in Missouri are \$480.24 billion between 2024 and 2051.

c. Total damages

Between 2020 and 2051, Table 1 presents the projected value of economic damages to the State of Missouri. The projected losses are divided, presenting those during the pandemic period and those after the pandemic that reflect productivity losses due to loss of school years. Based on the calculations presented here, the total losses in real GDP amount to over \$500 billion.

d. Revenue losses paid to State of Missouri

Between 2019 and 2023, the State of Missouri collected 3.1 cents per dollar of GDP. We apply this ratio to compute the foregone revenues that would have been collected by the State of Missouri for the period starting in 2020 and ending in 2051. The discounted sum of foregone revenues is simply the product of GDP losses and 0.031. Thus, the discounted sum of foregone revenues paid to State of Missouri government is \$15.61 billion.

⁵ The discount rate for any future year, therefore, is $(1 + 0.04)^{-(t - 2024)}$ where t stands for the future date from 2025 through 2051.

Table 1

Projected Losses in Missouri real GDP, 2020 – 2051

Period	Economic Loss to Missouri
2020:Q1 - 2023:Q2	\$23,207.75
2024- 2051	\$480,238.62
	\$503,446.37

2. Other estimates

In a paper by economists at University of Southern California (USC), the economic impact of the Covid-19 pandemic was estimated over the period 2020:Q1 through 2023:Q4.⁶ Using a Computable General Equilibrium model modified to deal with the economic impacts of a natural disaster, the researchers estimated the impact was lost GDP equal to \$14 trillion over the four-year period.

To estimate the impact borne by Missouri, we assume the losses are proportional to the state-level GDP. Between 2018:Q1 and 2024:Q2, Missouri’s real GDP was 1.55 percent of the national level. Under the assumption of proportional losses, the USC projections would project that Missouri lost \$216.42 billion between 2020 and 2023. The USC estimates are nearly ten times the projections reported using a Control and Treatment approach used in this report. For the sake of completeness, we include these estimates because they are generated using a more sophisticated modelling approach to construct the Control path for the economy. Combined with the economic growth impacts due to the school-year losses during academic year 2020-21, the discounted sum of total economic damages would be \$696.66 billion for the period 2020 through 2051.

Note that if Missouri’s lost real GDP is equal to \$216.42 billion, then the lost State of Missouri collections to General Revenue would be \$6.71 billion between 2020 and 2023. The discounted sum of State of Missouri revenue losses would be \$21.6 billion between 2020 and 2051.

Total Economic Damages

Now that each component of the economic damages has been calculated. Table 2 reports the total economic damages between March 2020 and December 2051. The dollar value of economic damages is calculated to be \$503,446,370,000. If we use the estimates from the University of Southern California, the

⁶ See Walmsley, Terrie, Adam Rose, Richard John, Dan Wei, Jakub P. Hlávka, Juan Machado, and Katie Byrd, (2023). “Macroeconomic Consequences of the COVID-19 Pandemic,” *Economic Modelling*, 120. The authors report that U.S. real GDP would have totaled \$117 trillion over the four-year span. Real GDP was only \$103 trillion.

total economic damages would be \$696,658,620,000. Lost revenues to the State of Missouri General Fund would be no less \$15.61 billion and could be as high as \$21.6 billion.

Witness' Qualifications

Dr. Joseph H. Haslag is Professor and Kenneth Lay Chair in Economics at the University of Missouri-Columbia. Professor Haslag received his PhD in Economics from Southern Methodist University in 1987. Professor Haslag spent 12 years in the Research Department at the Federal Reserve Bank of Dallas, teaching undergraduate and graduate courses at Southern Methodist University. He visited the Economics Department at Michigan State University in 2000 and the Department of Monetary Economics at Erasmus University in 1994. He has been a visiting scholar at the Federal Reserve Banks of St. Louis, Kansas City, Atlanta, and Cleveland. He has published his research in such prestigious academic journals as the *Journal of Monetary Economics*, *The Review of Economics and Statistics*, *Journal of Money, Credit, and Banking*, *International Economic Review* and the *Review of Economics Dynamics*, among other leading scholarly publications. His textbook on monetary economics, co-authored with Scott Freeman and Bruce Champ is in its 5th edition. Professor Haslag is under contract with Wiley Press to write an intermediate-level textbook on macroeconomics with Dr. Chris Otrok. According to Google Scholar, Dr. Haslag's work has been cited over 1,690 times.

At the University of Missouri, Joe has also been the Executive Director of the Economic and Policy Analysis Research Center until 2021. Joe continues to serve the State of Missouri, serving as the external member of the State's Consensus Revenue Forecasting team. He has been a member of the Federal Reserve Bank of Kansas City's Business and Economic Research Group.

Since 2014, Dr. Haslag has published ten research papers (listed below):

- 1) "Is the Funding Fee Enough? A Quantitative Analysis of the VA Mortgage Program," *International Journal of Social Science and Economic Research*, July 2022, 7(7), 2178-2216.
- 2) "Modeling Uncertainty: Two Approaches in a Model with Heterogeneous Forecasts (joint with William A. Brock), *The Singapore Economic Review*, June 2022, 67(4), 1389-1420.
- 3) "On the Economic Impacts of Transportation Innovations: A Comprehensive Application to Quantifying the Impacts of a Hyperloop Technology," *The Economics and Finance Letters*, May 2022, 110-124..
- 4) "Monetary and Fiscal Policy Interactions in a Frictional Model of Money, Nominal Debt, and Banking," *European Economic Review*, 139, October 2021.

- 5) “On Phase Shifts in a New Keynesian Model Economy,” (joint with Xue Li), *Macroeconomic Dynamics*, December 2021, 25(8), 2080-2101.
- 6) “Computing State Average Marginal Income Tax Rate: An Application to Missouri,” (joint with G. Dean Crader) *Growth and Change: A Journal of Urban and Regional Policy*, November 2018, 50(1), 424.45.
- 7) “Do Payment Systems Matter: A New Look,” (joint with Jim Dolmas) *Journal of Finance and Economics*, March 2018, 9(1), 1-25.
- 8) “A Tale of Two Correlations: Evidence and Theory Regarding the Phase shift between the Price Level and Output,” (joint with William A. Brock) *Journal of Economic Dynamics and Control*, June 2016, 67, 40-57.
- 9) “Government Policy under Price Uncertainty: A Source of Volatility in Illegal Immigration” (joint with Mark Guzman and Pia Orrenius), *Canadian Journal of Economics*, August 2015, 48(3), 940-962.
- 10) “Unconventional Optimal Open Market Purchases,” (joint with Chao Gu), *Review of Economic Dynamics*, July 2014, 17(3), 543-58.
- 11) *Modeling Monetary Economies*, 5th Edition, Cambridge University Press, 2023.

List of Expert Testimonies (4 Years):

- 1) Baker v. Martin Leigh (for defense), 2023
- 2) Ainsley Rice, et al v. Richard Gutknecht, MD (for defense), 2018
- 3) Heck and Harper v. Congruex (for defense), 2021
- 4) Hemphill v. St. Luke’s Hospital (for defense), 2022
- 5) Northland Management & Construction, LLC v. the City of Parkville, Missouri (for Plaintiff), 2024.

Fee Schedule

My compensation for research and testimony is \$400 per hour.

Exhibit

8

From:	"SMART Archive" <>
To:	SMART Core <>
Subject:	(b)(6) Say PRC Central Government -- Not Local Officials -- Responsible for the Coronavirus Cover-Up
Date:	Mon, 20 Jul 2020 09:18:30 GMT

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Sensitive



MRN: 20 TAIPEI 319
Date/DTG: Jul 20, 2020 / 200917Z JUL 20
From: AIT TAIPEI
Action: WASHDC, SECSTATE *ROUTINE*
E.O.: 13526
TAGS: PREL, PGOV, CN, TW, KNCV
Captions: ~~SENSITIVE~~
Reference: A) 20 TAIPEI 183
B) 20 BEIJING 485
C) 18 TAIPEI 145
D) 17 TAIPEI 511
E) 20 TAIPEI 299
F) 20 BEIJING 894
G) 20 BEIJING 359
H) 20 BEIJING 742
I) 20 TAIPEI 317
Pass Line: AMEMBASSY WELLINGTON PASS TO AMCONSUL AUCKLAND
Subject: (b)(6) Say PRC Central Government -- Not Local Officials -- Responsible for the Coronavirus Cover-Up

(b)(1); (b)(6)

(b)(1); (b)(6)

Who Ordered the Cover Up? The Signs Point to Beijing, not Local Officials

(b)(1); (b)(6)

Beijing Knew Earlier than They Admit

(b)(1); (b)(6)

(b)(1); (b)(6)

Leaked Directive Confirms Beijing Restricted Disclosure of Virus Information and Samples

(b)(1); (b)(6)

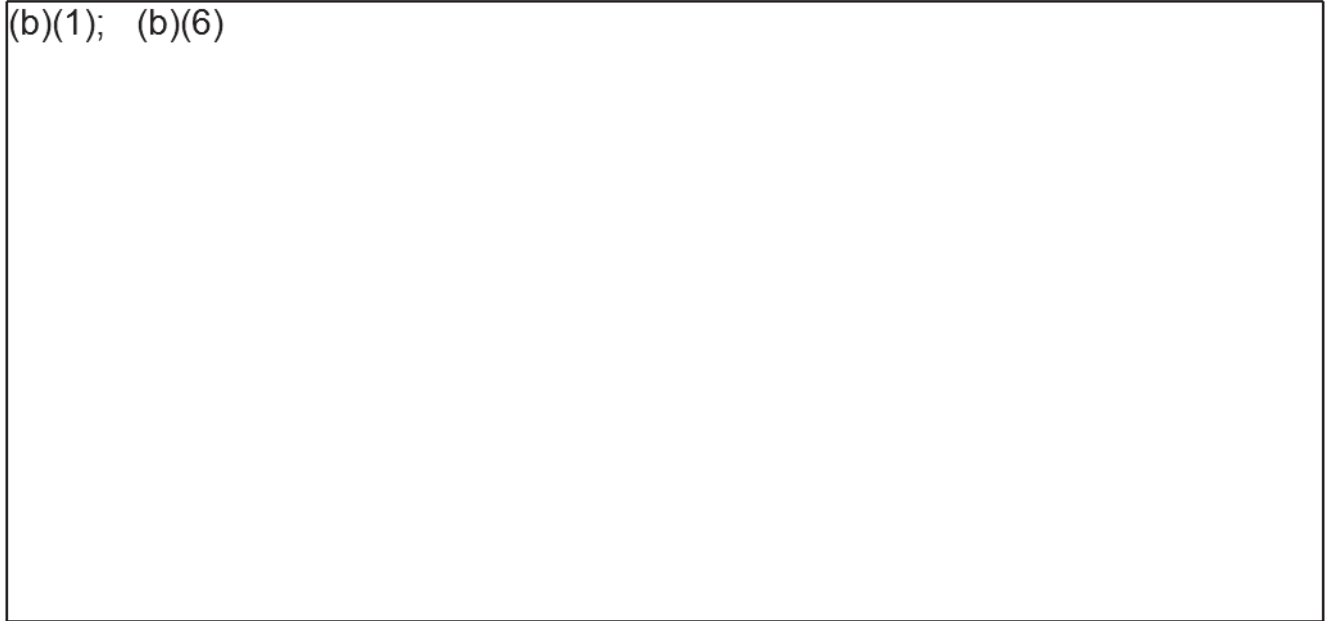
(b)(1); (b)(6)

Xi Lied to Obfuscate His Role in the Cover-Up

(b)(1); (b)(6)

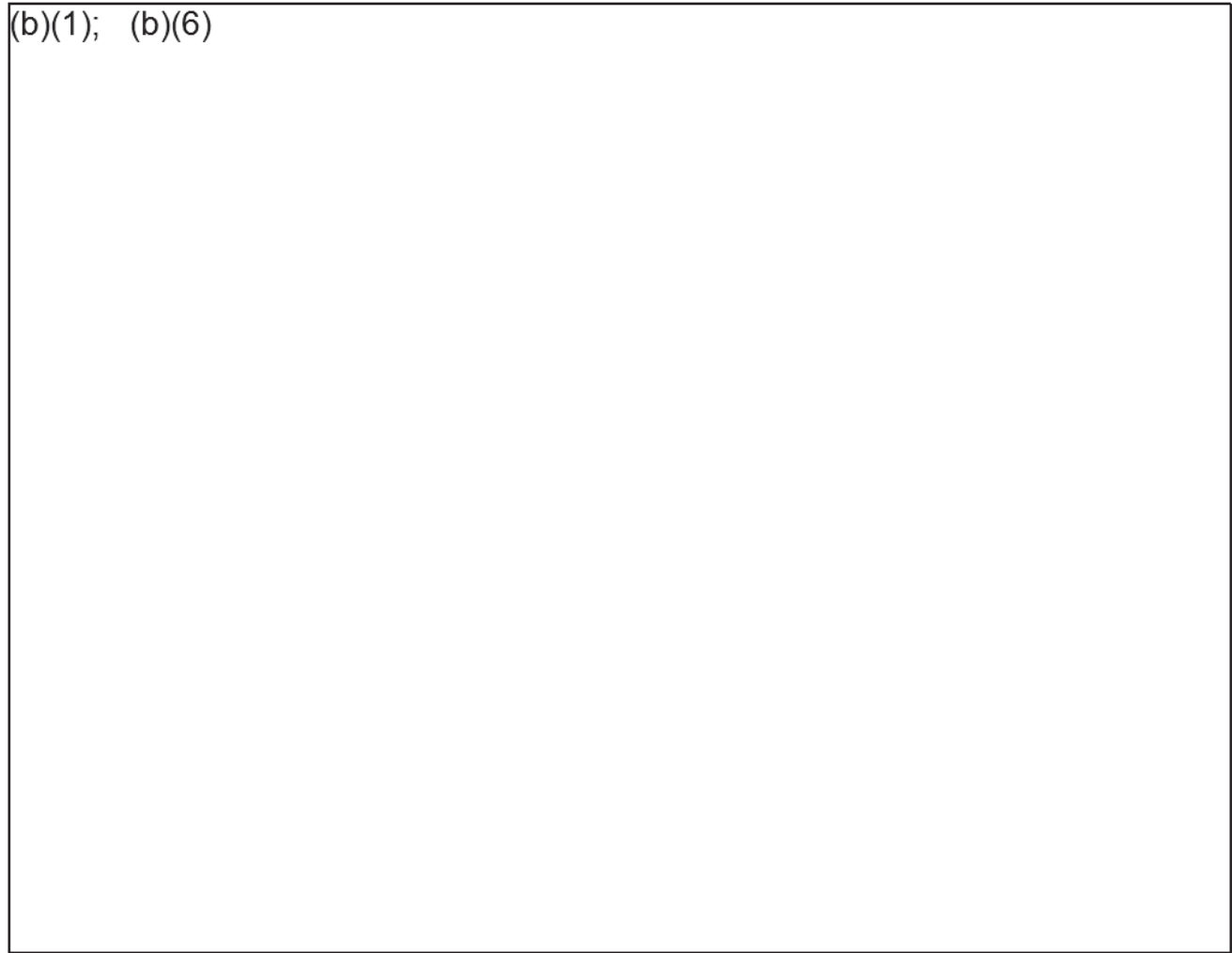
Would Beijing Have Been More Transparent Without Xi in Charge?

(b)(1); (b)(6)



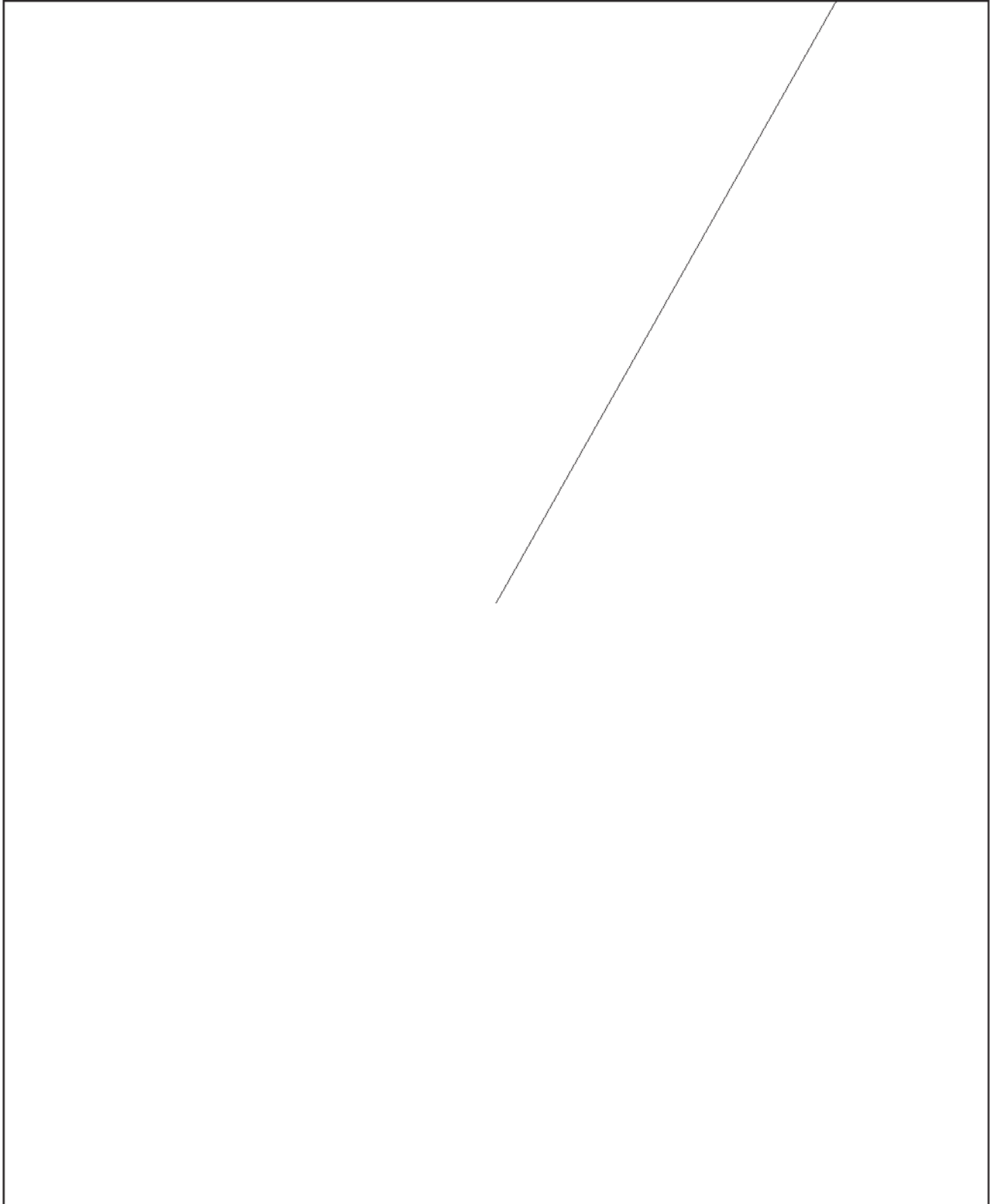
Initial Outbreak Could Have Been Contained in China if Beijing Had Not Covered it Up

(b)(1); (b)(6)



(b)(1);
(b)(6)

The Cover-Up and the CCP's Campaign of Propaganda and Disinformation



Signature:

(b)(6)

Classified By:

Name: (b)(6) Title: Director
Office: EXEC
Agency: AIT

Reason:

1.4 (b), (d)

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Released By:

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PACAF HICKAM AFB HI ROUTINE; COMMARFORPAC ROUTINE; CHINA
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PRC National Health Commission Directive.pdf, Caixin Neican Report.pdf

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Mr. (b)(6)
Political Officer
American Institute in Taiwan
Office: (b)(6)
Mobile: (b)(6)
Email: (b)(6)@state.gov

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国家卫生健康委员会办公厅

国卫办科教函(2020)3号

国家卫生健康委办公厅关于在重大突发 传染病防控工作中加强生物样本资源及 相关科研活动管理工作的通知

各省、自治区、直辖市及新疆生产建设兵团卫生健康委,各人间传
染的病原微生物高等级生物安全实验室:

为加强传染病疫情防控,根据《中华人民共和国传染病防治
法》《病原微生物实验室生物安全管理条例》等法律法规,现就重大
突发传染病防控工作期间,进一步做好有关病例生物样本资源
的采集、运输、使用及科研活动管理工作要求如下:

一、本通知中的生物样本资源,是指病人和疑似病人及其密切
接触者的血液、血清、咽拭子、痰液、气管吸取液或支气管灌洗液、
尿液、粪便,以及死亡患者尸体组织、器官等样品;各相关机构包括
各级疾病预防控制机构、医疗机构、相关科研机构、第三方检验检
测机构,以及其他可能利用生物样本开展工作的机构。

二、各相关机构应当在满足生物安全要求前提下,按照有关诊
疗和疾病监测工作规范采集病例生物样本,准确记录样本来源、种
类、数量,编号登记,并指定专门人员和机构保存管理。对涉及秘

密和个人隐私的,要加强保密意识并依据有关规定采取保密措施。

三、针对近期武汉肺炎病例样本,依据目前掌握的病原学特点、传播特性、致病性、临床资料等信息,在进一步明确病原信息之前,暂按照高致病性病原微生物(第二类)进行管理,相关样本的运输应当按照《可感染人类的高致病性病原微生物菌(毒)种或样本运输管理规定》(卫生部令第45号)要求进行;病原相关实验活动应当在具备相应防护级别的生物安全实验室开展。

四、各相关机构应当按照省级以上卫生健康行政部门的要求,向指定的病原检测机构提供生物样本开展病原学检测并做好交接手续;未经批准,不得擅自向其他机构和个人提供生物样本及其相关信息。

五、受省级以上卫生健康行政部门委托开展病原学检测的机构,应当妥善使用和保管生物样本,并按照规定处理使用后剩余样本;未经批准不得向任何其他机构和个人提供生物样本、病原体、培养物及其相关信息。

六、在本通知发布前,已经从有关医疗卫生机构取得相关病例生物样本的机构和个人,应当立即将样本就地销毁或送交国家指定的保藏机构保管,并妥善保存有关实验活动记录及实验结果信息。

七、疫情防控工作期间,各类机构承担病原学检测任务所产生的信息属于特殊公共资源,任何机构和个人不得擅自对外发布有

部门审核同意。

八、各相关机构的工作人员要弘扬追求真理、严谨治学的求实精神,加强学风作风建设,在涉及重大传染病、不明原因疾病等研究中,要树立公共卫生意识,严守法律红线和科研底线。机构应当对涉及传染病、生物安全领域的研究及论文、成果进行审核;未经科学验证和审核的观点,不得向社会公开传播。

九、各级卫生健康行政部门要切实加强组织领导,按照属地化、分级分类的原则开展实验室生物安全监管工作,明确工作职责,强化能力建设和日常监管,及时消除安全隐患,努力防范和化解重大生物安全风险,确保实验室生物安全万无一失。

十、我委将加强执法检查,对违法违规使用生物样本,不按要求报告检测结果、擅自发布疫情相关信息的机构和个人,依法严肃处理。



(信息公开形式:不予公开)

抄送：教育部、科技部、海关总署、中国科学院办公厅。

国家卫生健康委办公厅

2020年1月3日印发

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Mr. (b)(6)
Political Officer
American Institute in Taiwan
Office: (b)(6)
Mobile: (b)(6)
Email: (b)(6)@state.gov

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Exhibit 9



CDC Archive

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This is archived content from the CDC website. The information here may be outdated and links may no longer function. Go to [CDC Home](#) for all other recent information.

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First Travel-related Case of 2019 Novel Coronavirus Detected in United States

Press Release

For Immediate Release: Tuesday, January 21, 2020

Contact: [Media Relations](#)

(404) 639-3286

The Centers for Disease Control and Prevention (CDC) today confirmed the first case of 2019 Novel Coronavirus (2019-nCoV) in the United States in the state of Washington. The patient recently returned from Wuhan, China, where an outbreak of pneumonia caused by this novel coronavirus has been ongoing since December 2019. While originally thought to be spreading from animal-to-person, there are growing indications that limited person-to-person spread is happening. It's unclear how easily this virus is spreading between people.

The patient from Washington with confirmed 2019-nCoV infection returned to the United States from Wuhan on January 15, 2020. The patient sought care at a medical facility in the state of Washington, where the patient was treated for the illness. Based on the patient's travel history and symptoms, healthcare professionals suspected this new coronavirus. A clinical specimen was collected and sent to CDC overnight, where laboratory testing yesterday confirmed the diagnosis via CDC's Real time Reverse Transcription-Polymerase Chain Reaction (rRT-PCR) test.

CDC has been proactively preparing for the introduction of 2019-nCoV in the United States for weeks, including:

- First alerting clinicians on January 8, 2020, to be on the look-out for patients with respiratory symptoms and a history of travel to Wuhan, China.
- Developing guidance for clinicians for testing and management of 2019-nCoV, as well as guidance for home care of patients with 2019-nCoV.
- Developing a diagnostic test to detect this virus in clinical specimens, accelerating the time it takes to detect infection. Currently, testing for this virus must take place at CDC, but in the coming days and weeks, CDC will share these tests with domestic and international partners
- On January 17, 2020, CDC began implementing public health entry screening at San Francisco (SFO), New York (JFK), and Los Angeles (LAX) airports. This week CDC will add entry health screening at two more airports – Atlanta (ATL) and Chicago (ORD).
- CDC has activated its Emergency Operations Center to better provide ongoing support to the 2019-nCoV response.

has become ill.

Coronaviruses are a large family of viruses, some causing respiratory illness in people and others circulating among animals including camels, cats and bats. Rarely, animal coronaviruses can evolve and infect people and then spread between people, such as has been seen with Severe Acute Respiratory Syndrome (SARS) and Middle East Respiratory Syndrome (MERS). When person-to-person spread has occurred with SARS and MERS, it is thought to happen via respiratory droplets with close contacts, similar to how influenza and other respiratory pathogens spread. The situation with regard to 2019-nCoV is still unclear. While severe illness, including illness resulting in several deaths, has been reported in China, other patients have had milder illness and been discharged. Symptoms associated with this virus have included fever, cough and trouble breathing. The confirmation that some limited person-to-person spread with this virus is occurring in Asia raises the level of concern about this virus, but CDC continues to believe the risk of 2019-nCoV to the American public at large remains low at this time.

This is a rapidly evolving situation. CDC will continue to update the public as circumstances warrant.

For more information about the current outbreak in China, visit: <https://www.cdc.gov/coronavirus/novel-coronavirus-2019.html>

- For more information about Coronaviruses: <https://www.cdc.gov/coronavirus/index.html>
- For travel health information: <https://wwwnc.cdc.gov/travel/notices/watch/pneumonia-china>

###

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES 

CDC works 24/7 protecting America's health, safety and security. Whether disease start at home or abroad, are curable or preventable, chronic or acute, or from human activity or deliberate attack, CDC responds to America's most pressing health threats. CDC is headquartered in Atlanta and has experts located throughout the United States and the world.

Last Reviewed: January 21, 2020

Exhibit 10

FOCUS

A PUBLICATION OF THE

MISSOURI DEPARTMENT OF HEALTH & SENIOR SERVICES
BUREAU OF HEALTH CARE ANALYSIS AND DATA DISSEMINATION
JEFFERSON CITY, MISSOURI 65102-0570

November 2023

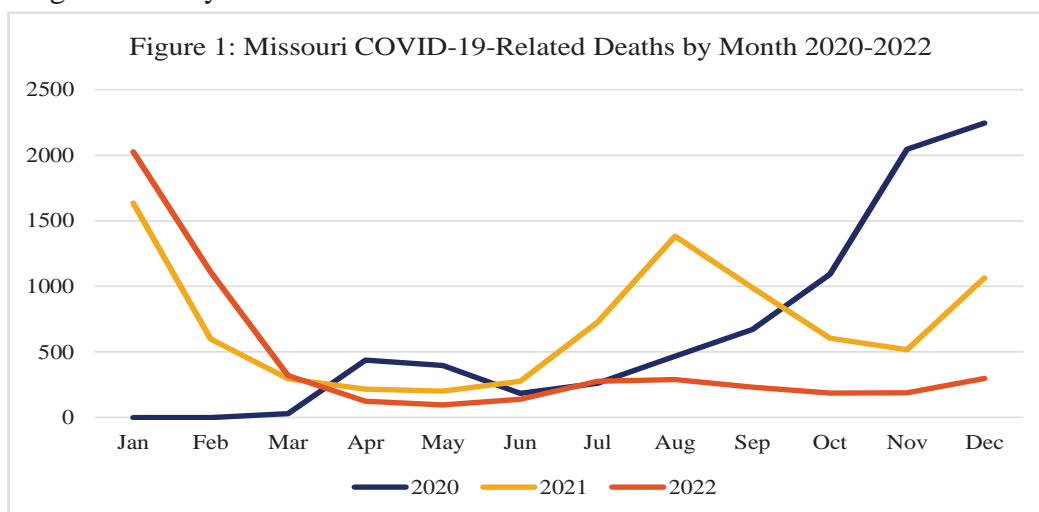
Missouri COVID-19 Mortality 2020-2022

During the three years of the COVID-19 pandemic, a total of 21,621 Missourians died of COVID-19 related deaths. There were 7,834 COVID-19-related deaths in 2020, 8,509 in 2021 and the number decreased to 5,278 in 2022. COVID-19 was the third leading cause of death in Missouri in 2020 and 2021 and the fourth leading cause in 2022.

The data in this report comes from Missouri resident death certificates, including resident in-state deaths and Missouri resident deaths that occurred in other states. It includes any death in which COVID-19 is an underlying or contributing cause of death. COVID-19 was the underlying cause for 89 percent of these deaths. The data will not match exactly to other data sources such as the Centers for Disease Control and Prevention (CDC) COVID Data Tracker or various media sources although it is reasonably close. Totals reported in this study differ by about five percent due to differences in data sources. The data for this analysis comes from Missouri's Vital Statistics Death file. The 2022 data reported in this article is still considered provisional, although final data is expected to change minimally.

For 2020-2022, the average number of total Missouri resident deaths per year was about 73,000 compared to about 62,000 for the previous three year period, 2017-2019, an increase of 17 percent. There was a total of 32,359 additional Missouri deaths in 2020-2022 vs 2017-2019 and COVID-19 accounted for about two-thirds of this increase. There were more deaths than births for each of the three years from 2020 to 2022. This is referred to as a natural decrease, and this was the first time since Missouri began keeping centralized vital statistics in 1911 that Missouri had experienced a natural decrease over a full year. The state life expectancy decreased from 77.4 years in 2019, the year before the pandemic, to 75.0 in 2020, 74.8 in 2021, and back up to 75.4 years in 2022.

Figure 1 shows the wide variation in COVID-19-related deaths by month. COVID-19 deaths peaked around 2,000 per month in November and December 2020, and January 2022. The average monthly count for the entire three-year period was about 600. Counts below 300 occurred in June and July 2020, March-June 2021 and April-December 2022.



(continued on next page)

The median age at death for COVID-19-related deaths in 2020-2022 was 76.8 years, similar to the median age of all deaths of 76.0 years. In 2020 the median age of COVID-19 related deaths was 80.4 and dropped sharply to 73.0 years in 2021 and went back up to 76.6 years in 2022. From May to December of 2022, the median age of COVID-19 mortality was above 80 years again.

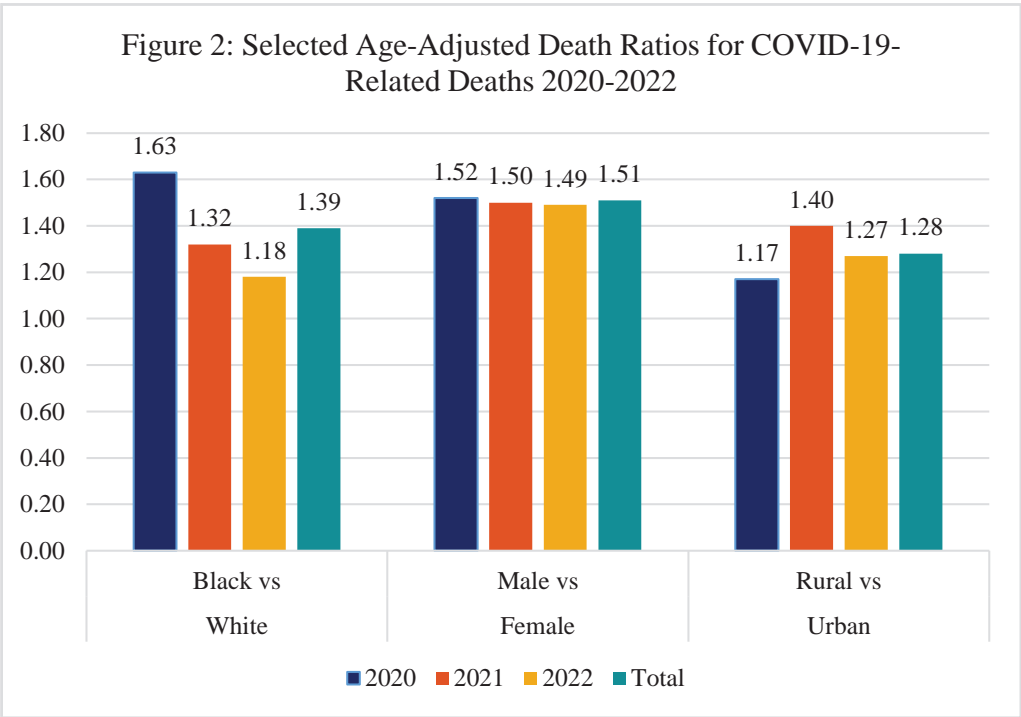
In 2021, when the Delta and Omicron variants were prevalent, the number of deaths under age 45 and aged 45-64 were greater than those in 2020 and 2022 combined. More than 30 percent of the 2021 COVID-19-related deaths were under age 65 compared to just 13.7 percent in 2020. The COVID-19 vaccines were widely used beginning in 2021, especially among the elderly and this, too, may have affected the age distribution.

These changes in age distribution by year also affected COVID-19 deaths by place of death. About 30 percent of COVID-19-related deaths occurred in nursing homes in 2020, and this dropped to 12 percent in 2021 and went back up to 19 percent for all of 2022 and 30 percent for the second half of 2022. Most COVID-19-related deaths occurred in hospitals, with about 60 percent occurring in 2020 and 2022 and 73 percent in 2021. In 2021, the peak year of hospital deaths, nearly 27 percent of all hospital deaths were COVID-19-related.

Age is the most important risk factor for COVID-19 mortality, as the death rate more than doubled for each ten-year increase in age as shown in Table 1. The death rate for persons aged 65 or more of 513.8 per 100,000 was 15.9 times higher than the death rate of 32.2 for persons under 65.

Table 1: COVID 19-related Deaths by Age with Rates per 100,000: Missouri 2020-2022

Age	Year			Death Rate	
	2020	2021	2022	2020-2022	
<5	0	4	9	13	3.4
5-14	1	2	3	6	0.3
15-24	8	30	19	57	2.4
25-34	26	105	47	178	7.3
35-44	78	280	126	484	20.6
45-54	212	679	276	1167	53.9
55-64	750	1492	768	3010	121.8
65-74	1606	2081	1167	4854	249.1
75-84	2278	2066	1430	5774	610.5
85+	2875	1770	1433	6078	1701.8
Total	7834	8509	5278	21621	116.8
Median age	80.4	73.0	76.6	76.8	



As shown in Figure 2, demographically, COVID-19-related death rates were higher among Black/African-Americans than Whites, among males compared with females and among rural residents compared with their urban counterparts. These comparisons were made after adjustment for age. Males had COVID-19 death rates about 50 percent higher than females for all three years shown.

Overall, Black/African-American Missourians had deaths rates 39 percent higher than White Missourians, but this differential varied greatly by year. In 2020 the differential was 63 percent, 32 percent in 2021 and just 18 percent in 2022. This may have been a reflection of where the largest outbreaks were located. In 2020, the original outbreaks were in the St. Louis area, where large numbers of Black/African-Americans reside. In 2021, the Delta variant started in the rural areas, while in 2022, COVID-19 cases were widely scattered throughout the state.

The 2020-2022 age-adjusted death rates for rural residents averaged about 28 percent higher than urban residents. This peaked in 2021 when the differential was 40 percent. Fewer hospitals and other health resources in rural areas as well as the fact that rural residents tended to have lower vaccination rates and to be more financially disadvantaged than urban residents may have been factors in these differences.

When analyzing the relationships between counties with high or low age-adjusted death rates and other variables for 2020-2022, counties with fewer than 50 deaths were excluded because their confidence intervals varied by an average of nearly 30 percent. After excluding these 33 counties, the ten counties with the lowest rates included mostly suburban counties and counties with large colleges. Boone County, where the University of Missouri-Columbia is located, had the lowest COVID-19-related death rate in the state followed by Andrew, Nodaway, Platte, St. Charles, St. Louis, Cape Girardeau, Cass, Adair and Jackson. Nodaway, Cape Girardeau and Adair Counties include large universities, while Platte, Cass and Jackson are part of the Kansas City area and Andrew is near St. Joseph. Washington County had the state’s highest rate for COVID-19 related deaths followed by these other rural counties scattered throughout the state; Ripley, Grundy, Livingston, Dent, Douglas, Gasconade, Pemiscot, Carroll and Bates.

Pearson correlation coefficients, which measure the degree of correlation between two variables, were calculated using county data as the base. The coefficients range from -1 to +1 with the closer they are to 1 or -1 the higher the degree of correlation and the closer to zero, the lower the correlation.

Table 2: COVID-19 Deaths with Pre-Existing Conditions by Selected Causes: Missouri Residents, 2020-2022 Compared with Same Conditions for all Natural Deaths Cumulative 2020-2022			
	COVID 19 Deaths		All Natural Deaths
	Number	Percent	Percent
Hypertension	2,357	10.9	12.0
Ischemic heart disease	2,051	9.5	7.6
Heart failure	1,729	8.0	9.6
Arrhythmia	1,551	7.2	6.7
Stroke	1,064	4.9	3.9
Other Circulatory conditions	1,698	7.9	7.1
Dementia	1,462	6.8	3.4
Alzheimer's disease	772	3.6	1.1
Diabetes	2,121	9.8	6.5
Chronic lower respiratory dis.	1,988	9.2	6.2
Cancer	1,266	5.9	6.2
Obesity	724	3.3	1.4
Liver Disease	177	0.8	0.9
AIDS	25	0.1	0.1
Total COVID-19 Deaths	21,621		

The COVID-19 vaccine rate of a county had the highest relationship to the age-adjusted death rates among variables studied at -0.52 meaning the higher the vaccine rate the lower the age-adjusted death rate. The poverty rate had a positive 0.39 coefficient which means the higher the poverty rate, the higher the death rate, followed by the proportion of the county urbanized (-.37). A coefficient of 0.22 or -0.22 is required in this situation to be a statistically significant Pearson correlation coefficient. The proportion of the county population that was Black/African-American had a coefficient of -0.17 with age-adjusted COVID-19 death rates, which was not significant.

Much has been discussed about various pre-existing conditions or co-morbidities that may exacerbate the effects of COVID-19 and increase the risk of severe illness or death. Some of these pre-existing conditions are shown in Table 2. These conditions came from a list that CDC created for those who are at high risk for getting very sick.¹ The leading co-morbidities listed as a contributing cause of death for COVID-19 related deaths include hypertension (10.9 percent), diabetes (9.8 percent), ischemic heart disease (9.5 percent), chronic lower respiratory diseases including asthma (9.2 percent), and heart failure (8.0 percent).

This distribution is not that different from the distribution of contributing causes for all natural deaths in Missouri as also shown in Table 2. Contributing causes that were much more

frequently mentioned on COVID-19 death certificates than all natural deaths included diabetes, obesity, chronic lower respiratory diseases, dementia and Alzheimer's disease. It should be noted that many of these conditions are likely underreported on the death certificate.

A study conducted by CDC² estimated the risk ratios of death for several of these pre-existing conditions, and obesity and diabetes were the leading co-morbidities with an increased risk of about 30 percent vs those without the condition. Chronic obstructive pulmonary disease had a higher risk of 20 percent and heart disease had a risk of 14 percent. These mortality risk ratios are similar to those found for some of the demographic variables such as race, gender or geographic residence, but nowhere near the nearly 16 to 1 risk ratio for age.

In summary, COVID-19 has had a catastrophic effect on Missouri's mortality, accounting for 21,621 deaths from 2020 to 2022. In 2022, the deaths were heavily skewed to the first quarter of the year with two-thirds of the deaths occurring in the first quarter. During the first quarter, COVID-19 ranked as the 3rd leading cause of death as it did in 2020 and 2021. However, from April to December 2022, COVID-19-related deaths averaged about 200 per month and ranked as the 8th leading cause of death in Missouri. So while the Public Health Emergency is over, the COVID-19 pandemic still exists but at a more manageable level.

1. Kompaniyets L, Pennington AF, Goodman AB, Rosenblum HG, Belay B, Ko JY, et al. "Underlying Medical Conditions and Severe Illness Among 540,667 Adults Hospitalized With COVID-19, March 2020–March 2021," *Prev Chronic Dis* 2021;18:210123. DOI: <http://dx.doi.org/10.5888/pcd18.210123external icon>.
2. "People with Certain Medical Conditions," *Centers for Disease Control and Prevention*. Accessed August 12th, 2023. <https://www.cdc.gov/coronavirus/2019-ncov/need-extra-precautions/people-with-medical-conditions.html>.

Exhibit

11



**Congressional
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COVID-19 and Domestic PPE Production and Distribution: Issues and Policy Options

December 7, 2020

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Informing the legislative debate since 1914

SUMMARY

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December 7, 2020

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COVID-19 and Domestic PPE Production and Distribution: Issues and Policy Options

The novel Coronavirus Disease 2019 (COVID-19) and its rapid emergence as a pandemic have highlighted issues relating to the production and distribution of personal protective equipment (PPE). PPE refers to worn articles or equipment that help minimize exposure to various hazards, including infectious pathogens. Given the role that PPE plays in mitigating the spread and reducing the impacts of COVID-19, PPE demand has spiked both globally and domestically while supply has been undercut by both rapid consumption as well as supply chain disruptions. According to multiple federal agencies, including the Government Accountability Office, the Food and Drug Administration, and various independent organizations, PPE continues to be in short supply, which has led to broad congressional and public interest in PPE production and distribution issues. The availability of effective PPE is critical to the ongoing pandemic response, but also has broader public health, emergency preparedness, and national security implications.

This report considers aspects of domestic production and distribution of PPE in the context of the COVID-19 pandemic. Specifically, the report considers (1) the availability of PPE supplies, including an assessment of PPE demand related to the COVID-19 pandemic; (2) federal actions and activities undertaken to increase PPE supplies in response to the pandemic, organized by executive agency and program; and (3) other policy options under consideration concerning PPE production and distribution, also organized by executive agency and program.

Overall, this report notes that data limitations and conflicting accounts impede the complete assessment of PPE supply chains, and this may undermine federal (as well as nonfederal) efforts to respond effectively to the COVID-19 pandemic. To the extent that data is available, current PPE production and distribution channels appear to continue to be insufficient compared to reported need. Various mechanisms that may be utilized to increase PPE supply or productive capacity, such as the provisions in the Defense Production Act of 1950 (DPA), appear to be applied selectively, and implemented unevenly, potentially based on narrow experience and limited administrative infrastructure within the federal government to oversee and manage its use in a national emergency context.

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Introduction

Personal protective equipment (PPE) shortages continue to be a factor in the ongoing federal, and nationwide, response to the COVID-19 pandemic. According to a September 2020 Government Accountability Office (GAO) report, PPE shortages “remain due to a limited supply chain with limited domestic production and high global demand.”¹ The Food and Drug Administration (FDA) has listed multiple categories of PPE on its medical device shortage list.² In addition, recent independent surveys show that acute PPE shortages continue to be an issue in nursing home environments,³ as well as generally among the domestic nurse population.⁴ In response, Congress has issued letters,⁵ introduced legislation,⁶ and opened investigations⁷ as a means of studying and potentially addressing the extended PPE shortage issue.

This report supports demonstrated congressional interest in this topic, given the continued relevance of PPE shortages amid the pandemic. This report considers aspects of domestic production and distribution of PPE in the context of the COVID-19 pandemic, including

1. information, context, and analysis regarding domestic production and distribution of PPE;
2. demand for PPE over the course of the pandemic and its effect on supply;
3. how the federal government has addressed shortages with existing and emergency authorities; and
4. federal policy options currently under consideration to increase domestic PPE production and supply to meet current and anticipated demand for PPE.

This report is focused specifically on PPE, and does not explicitly consider or address Trump Administration actions related to the production and distribution of other health and medical

¹ Government Accountability Office (GAO), *COVID-19: Federal Efforts Could be Strengthened by Timely and Concerted Actions*, GAO-20-701, September 2020, p. 111 (hereinafter GAO, *COVID-19: Federal Efforts*), at <https://www.gao.gov/assets/710/709492.pdf>.

² Food and Drug Administration (FDA), *Medical Device Shortages During the COVID-19 Public Health Emergency*, September 24, at <https://www.fda.gov/medical-devices/coronavirus-covid-19-and-medical-devices/medical-device-shortages-during-covid-19-public-health-emergency>.

³ Brian E. McGarry, David C. Grabowski, and Michael L. Barnett, “Severe Staffing And Personal Protective Equipment Shortages Faced By Nursing Homes During The COVID-19 Pandemic,” *Health Affairs*, vol. 39, no. 10 (August 10, 2020), accessed at <https://www.healthaffairs.org/doi/full/10.1377/hlthaff.2020.01269>.

⁴ American Nurses Association, *New Survey Findings from 21K US Nurses: PPE Shortages Persist, Re-Use Practices on the Rise Amid COVID-19 Pandemic*, September 1, 2020, at <https://www.nursingworld.org/news/news-releases/2020/new-survey-findings-from-21k-us-nurses—ppe-shortages-persist-re-use-practices-on-the-rise-amid-covid-19-pandemic/>.

⁵ Letter from Hon. Richard E. Neal, Chairman, House Committee on Ways & Means, to Hon. Michael Pence, Vice President, April 1, 2020, at <https://waysandmeans.house.gov/sites/democrats.waysandmeans.house.gov/files/documents/2020.4.1%20WM%20PPE%20Ltr%20to%20Task%20Force.pdf>.

⁶ Office of Senator Chris Murphy, “Murphy, Blumenthal, Baldwin Introduce NDAA Amendment To Increase National Production Of Testing Supplies And PPE As Covid-19 Cases Rise,” press release, June 1, 2020, at <https://www.murphy.senate.gov/newsroom/press-releases/murphy-blumenthal-baldwin-introduce-ndaa-amendment-to-increase-national-production-of-testing-supplies-and-ppe-as-covid-19-cases-rise->.

⁷ Letter from Hon. James E. Clyburn, Chairman, House Select Subcommittee on the Coronavirus Crisis, Hon. Maxine Waters, Chairwoman, House Committee on Financial Services, Hon. Carolyn B. Maloney, Chairwoman, House Committee on Oversight and Reform, and Hon. Stephen F. Lynch, Chairman, House Subcommittee on National Security, to Hon. Mark T. Esper, Secretary of Defense, October 2, 2020, at <https://coronavirus.house.gov/sites/democrats.coronavirus.house.gov/files/2020-10-02.Clyburn%20Waters%20CBM%20SFL%20to%20Esper-%20DOD%20re%20CARES%20Act.pdf>.

resources, such as vaccines or pharmaceutical ingredients. However, some of the information contained herein may be relevant to the broader production of health and medical resources, including vaccine development.

What's in a Name? PPE and Descriptive Conventions

Personal protective equipment, or PPE, refers to worn articles or equipment that help minimize exposure to various hazards, including infectious pathogens like the novel coronavirus that causes COVID-19. Examples include surgical masks, N95 respirators, sterile gloves, surgical gowns, face shields, and the like. However, because this report considers not only the finished PPE articles themselves, but the broader production and distribution of those supplies (i.e., the domestic supply chains), descriptions and analysis in this report include inputs and other production elements that may not alone be considered PPE, such as synthetic textiles or pharmaceutical agents, but are important parts of the production process. In addition, although this report focuses on PPE (and their relevant constituent production inputs), it also is potentially broadly applicable to other non-PPE medical articles or devices. This includes medical articles or devices that may be directly noted, or implied, during discussions around "PPE," as that term may be sometimes used as a metonym for a variety of articles for controlling the COVID-19 pandemic, such as testing supplies, hand sanitizer, prophylaxes, and vaccines to a certain extent—as well as their respective material or chemical components.

The data in this report are subject to regular update, correction, and reinterpretation by the agencies that release them, as well as by CRS analysts. As such, this report will be updated regularly as necessary, particularly during the duration of the COVID-19 pandemic. This report was centrally coordinated but collaboratively written between all the authors, with extensive peer review as part of the normal CRS editorial process. Individual authors' specific section contributions generally hew to their areas of expertise as tabulated in **Appendix B**.

PPE Production and Distribution: Status in Context

The COVID-19 pandemic has demonstrated ways in which the United States relies heavily on global supply chains (see text box) for many essential goods and materials related to PPE. Domestic shortages of critical supplies and medical products have prompted congressional interest in a better understanding of import trends as well as of domestic production capacity in essential industries. The pandemic also demonstrated the potential limitations of globalized supply chains, as public health countermeasures created difficulties maintaining production, while high global demand interrupted distribution.

Congress and the Trump Administration have sought ways to increase the U.S. supply of personal protective equipment (PPE), pharmaceuticals, and other medical products by providing economic incentives to firms. They have also strengthened government procurement requirements to better prioritize domestically-produced goods.⁸ One policy response by the Administration, similar to what occurred in many other countries, was to impose export bans on PPE as a means of

⁸ White House, "Executive Order on Maximizing Use of American-Made Goods, Products, and Materials," July 15, 2020, at <https://www.whitehouse.gov/presidential-actions/executive-order-maximizing-use-american-made-goods-products-materials/>, and "Executive Order on Ensuring Essential Medicines, Medical Countermeasures, and Critical Inputs Are Made in the United States," August 6, 2020, at <https://www.whitehouse.gov/presidential-actions/executive-order-ensuring-essential-medicines-medical-countermeasures-critical-inputs-made-united-states/>. See also Andrea Shalal and Susan Heavy, "Trump Order to Buy U.S.-Made Medical Supplies Coming Soon: Navarro," *Reuters*, May 4, 2020; Kayla Tausche, Ryan Bhattacharjee, and Lauren Hirsch, "White House Preparing Executive Order Requiring Certain Essential Drugs Be Made in U.S., Sources Say," *CNBC*, May 15, 2020; and *The Hill*, "Trump to Sign Order Seeking to Boost Domestic Drug Manufacturing," August 6, 2020.

preserving domestic stocks.⁹ However, some experts questioned this strategy, noting that domestic bans constrained trade flows and, in aggregate, could exacerbate supply shortages.¹⁰

China's Role in Domestic PPE Supply Chains

China is a major U.S. and global supplier of medical PPE, medical consumables, and active pharmaceutical ingredients. According to U.S. trade data, in 2019 China supplied over 70% of U.S. imports of textile face masks, 55% of U.S. imports of protective eyewear, and 55% of U.S. imports of protective garments for surgical and medical use.¹¹ The spike in demand for PPE and pharmaceuticals due to the COVID-19 pandemic has highlighted the potential risks of these dependencies on China. In January and February 2020, at the height of the COVID-19 outbreak in China, and prior to the emergence of major clusters in the United States, the Chinese government organized a large-scale purchase of PPE for China on the global market, depleting existing supplies in the United States and other countries such as Australia and Canada.

In early February 2020, the Chinese government nationalized control of the production and distribution of medical supplies in China, including PPE.¹² China's nationalization efforts, while understandable as part of its response to address its COVID-19 outbreak (which preceded similar policies by other pandemic-affected countries, including the United States), may have denied the United States and other countries timely access to critical medical supplies. Although China imposed no formal export restrictions on the export of PPE, multinational manufacturers of PPE, including Minnesota-based 3M and Canadian firm Medicom, informed the media that all masks produced in their facilities in China were procured to meet domestic demand, while China allowed only smaller manufacturers to export PPE, some of which recipient countries, including the United States, found to be unusable.¹³ China did not provide notice of its *de facto* export constraints to the World Trade Organization (WTO), as other countries did.¹⁴ Subsequently, China's imposition of new export quality checks for PPE, particularly masks, implemented by China's National Medical Products Administration (NMPA) in April 2020, further slowed exports. Some U.S. legal experts observed that China may have been using informal measures, such as administrative guidance, to prioritize exports to certain countries ahead of the United States, potentially for political reasons,¹⁵ as the Chinese government orchestrated highly-publicized PPE deliveries to countries in Europe.

⁹ Pamela Boykoff, Clare Sebastian, and Valentina Di Donato, "In the Race to Secure Medical Supplies, Countries Ban or Restrict Exports," *CNN.com*, March 27, 2020, at <https://www.cnn.com/2020/03/27/business/medical-supplies-export-ban/index.html>.

¹⁰ Stormy-Annika Mildner et al., *Export Controls and Export Bans over the Course of the Covid-19 Pandemic*, World Trade Organization, April 29, 2020, at https://www.wto.org/english/tratop_e/covid19_e/bdi_covid19_e.pdf.

¹¹ It is not always possible to estimate the share that imports from China—or any other trading partner—make up in total U.S. supply. Harmonized Tariff Schedule of the United States (HTSUS) codes used to record U.S. exports and imports and North American Industry Classification System (NAICS) categories used to record domestic production cannot be matched directly due to differences in how the two systems classify products. As Pierce and Schott (2009) note, HTSUS codes are based solely on product characteristics, while NAICS codes may also take into account production methods. As a result, it may not be possible to match a given HTSUS category to a single NAICS category. In addition, U.S. exports and imports cannot be broken out by the full set of NAICS categories. For more details on these limitations, see Justin R. Pierce and Peter K. Schott, "A Concordance Between Ten-Digit U.S. Harmonized System Codes and SIC/NAICS Product Classes and Industries," NBER Working Paper No. w15548, 2009. Also see CRS In Focus IF11648, *Medical Supply Chains and Policy Options: The Data Challenge*, by Andres B. Schwarzenberg and Karen M. Sutter.

¹² Zhang Pinghui and Zhou Xin, "Coronavirus: China Shifts Responsibility over Medical Supplies amid Mask Shortage, Rising Death Toll," *South China Morning Post*, February 3, 2020, updated on February 14, 2020.

¹³ Keith Bradsher and Liz Alderman, "The World Needs Masks. China Makes Them—But Has Been Hoarding Them," *New York Times*, March 16, 2020; John Miller, "Swiss Warn over Faulty Protective Masks Bought During COVID-19 Rush," *Reuters*, July 17, 2020; Alexandra Stevenson and Tiffany May, "China Pushes to Churn Out Coronavirus Gear, Yet Struggles to Police It," *New York Times*, March 27, 2020; and "Coronavirus: Countries Reject Chinese-Made Equipment," *BBC*, March 30, 2020.

¹⁴ World Trade Organization (WTO), "Standards, Regulations and COVID-19—What Actions Taken by WTO Members?" information note, May 20, 2020, at https://www.wto.org/english/tratop_e/covid19_e/standards_report_e.pdf.

¹⁵ Steve Dickinson, "Buying Face Masks and Other PPE from China Just Got a LOT Tougher," *Harris Bricken China Law Blog*, April 2, 2020, at [https://www.chinalawblog.com/2020/04/buying-face-masks-and-other-ppe-from-china-\(continued...\)](https://www.chinalawblog.com/2020/04/buying-face-masks-and-other-ppe-from-china-(continued...))

This realization of the potential risks of concentrated dependence on China for critical products and inputs has led the U.S. government and some in U.S. industry to consider mitigating supply chain risk by diversifying sources of supply. These efforts include re-shoring some domestic production of PPE and exploration of potential sourcing arrangements with other countries and trading partners, such as Vietnam and Mexico—countries which also benefit from low labor and input costs coupled with an increasingly skilled workforce.¹⁶ Despite relying on China for certain PPE and active pharmaceutical ingredients (API), the United States together with Europe is a global leader in high-end medical devices and novel pharmaceutical drug innovation, sectors in which China is seeking to gain an advantage through its industrial policies such as *Made in China 2025*. U.S. efforts to re-shore or diversify supply chains are primarily responding to an immediate crisis. Although they respond to current short-term shortages, these efforts may not be attuned to material requirements that will be needed at later stages in the pandemic, such as for vaccine development and deployment. These efforts may also require more strategic considerations such as how to sustain U.S. competitiveness in advanced manufacturing and medical sectors in response to China's state-led policies that may aim to dilute these advantages.

Within this context, some Members have inquired about rates of domestic PPE consumption (i.e., demand for PPE) to better understand how it may relate to domestic production, versus those imported.¹⁷ Other Members have sought information about the potential for “reshoring,” or relocating domestically, some global supply chains from abroad (particularly, but not only, China), and domestic producers’ capacity to meet future U.S. demand.¹⁸ However, definitional differences in categorizing domestic and imported products make it difficult to assess overall levels of U.S. import dependencies for PPE and other various medical goods. Relatedly, a dearth of validated and verifiable data and information limits the assessment of both the size and composition of the U.S. PPE market, as well as the overall capability of U.S.-based producers to satisfy essential national needs for PPE, in addition to pharmaceuticals and other medical supplies.

Domestic Supply: U.S. vs. Foreign Made

Because of limited data availability, establishing a baseline for domestic- and foreign-produced PPE is challenging, but necessary in order to develop policy options to address potential PPE supply chain vulnerabilities. In general, the U.S. government does not record domestic production of specific items (e.g., surgical masks or latex gloves) by quantity or value, nor does it track how much of this production is ultimately destined for the U.S. market.¹⁹ However, the U.S. government does track categories of domestic exports to foreign markets, including for certain

just-got-a-lot-tougher.html; Kate O’Keefe, Liza Lin, and Eva Xiao, “China’s Export Restrictions Strand Medical Goods U.S. Needs to Fight Coronavirus, State Department Says,” *Wall Street Journal*, April 16, 2020; and Dan Harris, “Webinar: Navigating PPE Purchases from China,” remarks during webinar, April 23, 2020, at <https://www.chinalawblog.com/2020/04/webinar-today-navigating-ppe-purchases-from-china.html>.

¹⁶ “China Is Using Uighur Labor to Produce Face Masks,” *New York Times*, July 19, 2020; Kevin Sieff, “Mexican Factories Boost Production of Medical Supplies for U.S. Hospitals While Country Struggles with Its Own Coronavirus Outbreak,” *Washington Post*, April 3, 2020; Bruce Delteil, Matthieu Francois, and Nga Nguyen, “Emerging from the Pandemic, Vietnam Must Position Itself for Recovery,” *McKinsey & Company*, July 1, 2020; and U.S. Agency for International Development, “USAID Identifies Vietnamese Suppliers of Personal Protective Equipment (PPE) and Other Medical Supplies Needed for the U.S. Domestic COVID-19 Response,” press release, April 10, 2020.

¹⁷ See, for example, Office of Senator Lindsay Graham, “Graham: We Must No Longer Be Reliant on China for PPE,” July 16, 2020, at <https://www.lgraham.senate.gov/public/index.cfm/2020/7/graham-we-must-no-longer-be-reliant-on-china-for-ppe>.

¹⁸ See, for example, CRS Report R46304, *COVID-19: China Medical Supply Chains and Broader Trade Issues*, coordinated by Karen M. Sutter.

¹⁹ Some agencies, including the U.S. Food and Drug Administration (FDA) and the U.S. Department of Commerce, collect more information than they make publicly available, which is due in part to confidentiality requirements (e.g., 13 U.S.C. §9 and 15 C.F.R. §801.5). However, none collects detailed quantity and value information of total U.S. production at the item level.

categories of PPE. It also collects statistics for broad industry sectors, such as gross output, value added—also known as gross domestic product (GDP)—by industry, and constituent inputs within production supply chains.²⁰

Questions such as “how much PPE does the United States currently produce relative to what it imports?” or “by how much has domestic production of pharmaceuticals increased since the COVID-19 outbreak?” are not easy to answer. A complicating factor in the analysis of U.S. production and reliance on imports of PPE and medical products is that there are no domestic or internationally agreed guidelines, standards, or definitions of what specific products make up these categories. For example, KN95 respirator masks—China-made analogues to domestically regulated N95 respirators—are generally not authorized as medical PPE in the United States, though they are in many countries abroad, and have received temporary (and limited) Emergency Use Authorization from the FDA.²¹ However, a rough estimate of the share that imported PPE and medical products make up in total U.S. supply can be gleaned from an annual government survey of U.S. manufacturers. This information, analyzed in conjunction with official U.S. trade statistics, provide partial insight into some domestic production activities. This estimate is discussed in the subsequent section.

Annual Survey of Manufactures and Trade Statistics

The U.S. Census Bureau’s Annual Survey of Manufactures (ASM) measures current U.S. manufacturing activity, such as industry outputs, inputs, and operating status.²² It provides sample estimates of statistics for manufacturing establishments in the United States based on the North American Industry Classification System (NAICS).²³ ASM statistics include the value added by manufacturing, total value of shipments for close to 1,400 classes of manufactured products, costs of materials, and inventories. However, NAICS categories may not capture all establishments producing PPE, pharmaceuticals, and medical products. Some goods may be dual- or multi-use for medical as well as other industries, for example, and may not be captured. Another challenge is a time lag with the data, which prevents the U.S. government from developing an understanding of current industry capacity or trends. As of October 2020, 2018 is the most recent year for which data are presently available.²⁴

The U.S. Bureau of Economic Analysis (BEA) and Census Bureau collect data on U.S. exports and imports on a monthly, quarterly, and yearly basis.²⁵ To estimate the domestic supply of PPE and other medical articles, CRS cross-referenced BEA’s dataset with the ASM to obtain a rough estimate of the imported share of U.S. supply for some NAICS categories considered to include PPE, as well as pharmaceuticals and other medical-related products in 2018. CRS was then able

²⁰ For more detail, see U.S. Bureau of Economic Analysis, “Industry Economic Accounts,” at <https://www.bea.gov/data/economic-accounts/industry>. However, quantity and value information of total U.S. production is not available at the item level.

²¹ FDA, Certain Filtering Facepiece Respirators from China May Not Provide Adequate Respiratory Protection—Letter to Health Care Providers, October 15, 2020, at <https://www.fda.gov/medical-devices/letters-health-care-providers/certain-filtering-facepiece-respirators-china-may-not-provide-adequate-respiratory-protection-letter>.

²² U.S. Census Bureau, “Annual Survey of Manufactures (ASM),” at <https://www.census.gov/econ/overview/ma0300.html>.

²³ For more detail on NAICS, see U.S. Census Bureau, “North American Industry Classification System: Introduction to NAICS,” at <https://www.census.gov/eos/www/naics/>.

²⁴ U.S. Census Bureau, “Annual Survey of Manufactures: Summary Statistics for Industry Groups and Industries in the U.S.: 2018.”

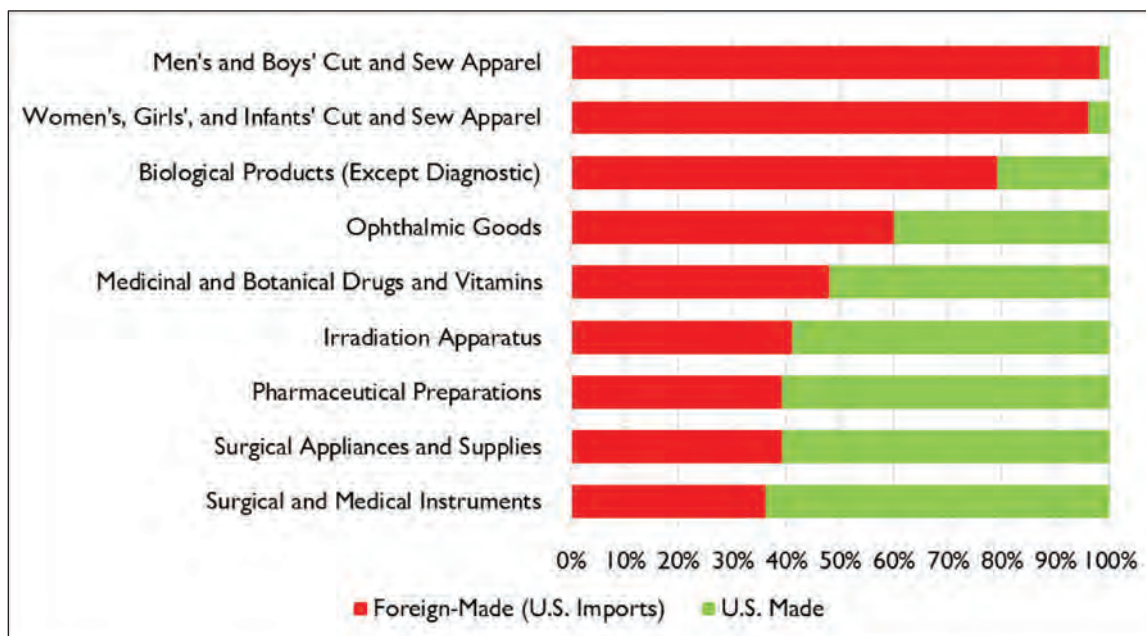
²⁵ U.S. Bureau of Economic Analysis (“International Transactions” and “International Trade in Goods and Services”) and U.S. Census Bureau (“Foreign Trade”).

to infer, by subtraction, the estimated domestic share of U.S. supply of PPE and medical goods NAICS categories. The figures were disaggregated and calculated at the NAICS six-digit subheading level—the most specific level for which NAICS data are available. However, because these are broad product categories, the data likely underestimate or overestimate actual domestic production and imports.²⁶

CRS compiled and analyzed this data to develop estimates of PPE imports, which suggest that the United States' dependence on foreign imports varies from industry-to-industry, with a heavy dependence on foreign imports in several industries (for more than 90% of domestic medical-related supply in some cases) (see **Figure 1**). In 2018, the United States imported many low-supply chain and labor-intensive manufactured products from China (e.g., apparel made from fabric, such as hospital gowns). Notably, some of the higher value-added and skill-intensive imported products came mainly from Europe (e.g., irradiation machines and biological products, such as vaccines) or were produced domestically (e.g., MRI equipment). The estimates likely understate the extent to which the United States relies on China for certain products, as some U.S. imports may contain a high share of Chinese content but may not always be classified as Chinese in origin when imported into the United States, due to prevailing labeling regulations.

**Figure 1. Estimate of the Domestic and Imported Shares of U.S. Supply:
Selected Medical-Related NAICS Categories**

share of U.S. Domestic Supply (%) in 2018



Source: CRS analysis with data from the U.S. Census Bureau, the U.S. Bureau of Economic Analysis, and the U.S. International Trade Commission.

Notes: For more detail, see **Appendix D**.

This picture may have changed between 2018 and 2020, especially if the U.S. began importing more sophisticated medical and pharmaceutical goods from China. Recently, the Chinese

²⁶ For more on data limitations, see **Appendix D**. U.S. import statistics include imports of goods from U.S.-owned affiliates abroad. (1) Rough estimates are calculated at the NAICS six-digit subheading level, which may cover products that are not for medical use; (2) 2018 is the most recent year for which annual data from the Annual Survey of Manufactures are available.

government has invested in ambitious, state-led programs such as Made in China 2025 (MIC2025).²⁷ One of MIC2025's goals is to modernize the Chinese economy and turn China into a global leader in the manufacturing of biopharmaceuticals and high-performance medical devices.²⁸ Lack of data and other constraints limit the ability to assess in real time the progress of these efforts and their impact on the U.S. economy and industrial base.

Other Sources of Data and Information

Data limitations relate to both the availability of data, as well as gaps in U.S. government reporting, which complicates assessments of U.S. reliance on foreign goods.²⁹ The U.S. General Services Administration (GSA)'s federal contracting database, the Federal Procurement Data System-Next Generation (FPDS-NG), reports federal procurement contracts whose estimated value is \$10,000 or more.³⁰ The FPDS-NG data, however, are not fully reliable. Documented quality issues relating to the accuracy, completeness, and timeliness of this data are among the limitations.³¹ These concerns have prompted many analysts to primarily rely on FPDS-NG data to identify broad trends and produce rough estimates, or to gather information about specific contracts. Despite these limitations, the data may provide general information regarding the value, quantity, and types of domestic and foreign-made goods that U.S. government agencies procure. For more information about federal procurement practices, see **Appendix A**.

Other information on domestic capacity, including changes during the COVID-19 pandemic, generally comes from private research firms, news outlets, and trade associations. Many of the estimates cited are based on surveys, private entities' press releases, or industry forecasts, which may differ significantly from actual production.

COVID-19: Assessing PPE Demand

The federal government's access to valid, reliable, and timely data concerning domestic supply chains for goods, including PPE, has been a complicating factor in its response to the COVID-19 pandemic. Planning for health emergencies has been a shared responsibility between the federal and State, Local, Tribal, and Territorial (SLTT) governments. States and other subnational jurisdictions have had much of the responsibility for developing contingency planning for health emergencies, with the federal government in a support posture.³² However, the COVID-19 pandemic has strained both domestic and international medical supply chains as demand for PPE escalated.

In the initial stages of the domestic COVID-19 pandemic, the Department of Health and Human Services (HHS) led the federal response, in accordance with the authorities invoked under the

²⁷ For more detail on MIC2025, see CRS In Focus IF10964, "*Made in China 2025*" *Industrial Policies: Issues for Congress*, by Karen M. Sutter.

²⁸ CRS In Focus IF10964, "*Made in China 2025*" *Industrial Policies: Issues for Congress*, by Karen M. Sutter.

²⁹ For more detail on the role of international trade in U.S. government procurement, see CRS In Focus IF11580, *U.S. Government Procurement and International Trade*, by Andres B. Schwarzenberg.

³⁰ The primary federal procurement reporting tool is scheduled to move from FPDS-NG to the System for Award Management (SAM) in October 2020.

³¹ For more information on FPDS-NG data quality issues, see "Appendix A. FPDS Background, Accuracy Issues, and Future Plans" in CRS Report R44010, *Defense Acquisitions: How and Where DOD Spends Its Contracting Dollars*, by John F. Sargent Jr. and Christopher T. Mann.

³² Office of the Assistant Secretary for Preparedness and Response (ASPR), "2017-2022 Health Care Preparedness and Response Capabilities," at <https://www.phe.gov/Preparedness/planning/hpp/reports/Documents/2017-2022-healthcare-pr-capabilities.pdf>.

Public Health Emergency declared on January 31, 2020, under the Public Health Service Act.³³ In late February 2020, HHS Secretary Alex Azar testified to Congress that federal stockpiles required 300 million N95 respirator masks to adequately respond to the outbreak (as assessed in February 2020), and that federal stockpiles faced acute shortages of N95 respirators and other PPE.³⁴ The HHS Assistant Secretary for Preparedness and Response (ASPR) also reported that he was working with industry to anticipate and address any potential supply shortages.³⁵ Per Public Health Service Act Section 2811, the ASPR is “the principal advisor to the [HHS] Secretary on all matters related to Federal public health and medical preparedness and response for public health emergencies.”³⁶ The Food and Drug Administration (FDA) within HHS also reported proactively reaching out to manufacturers to identify potential disruptions or shortages.³⁷ FDA’s role in assessing and addressing PPE demand is discussed in further detail later in this section.

According to HHS documents released by Congress, the federal government established early in the pandemic that existing stockpiles and public health mechanisms were insufficient to meet the demands of the pandemic.³⁸ Media reports proliferated about inadequate PPE and other medical supplies for health care workers,³⁹ “essential” workers,⁴⁰ and more generally.⁴¹ In response, reuse of PPE was reportedly widespread, and standardized practices were prescribed by major industry organizations such as the American College of Surgeons.⁴²

In late March 2020, following declarations of Emergency and Major Disaster for COVID-19 under the Robert T. Stafford Disaster Relief and Emergency Assistance Act (the Stafford Act, as amended; P.L. 93-288), the Federal Emergency Management Agency (FEMA) took over the role

³³ U.S. Department of Health and Human Services (HHS), “Secretary Azar Declares Public Health Emergency for United States for Coronavirus Disease 2019,” press release, January 31, 2020, at <https://www.hhs.gov/about/news/2020/01/31/secretary-azar-declares-public-health-emergency-us-2019-novel-coronavirus.html>. For more information, see CRS Report R46219, *Overview of U.S. Domestic Response to Coronavirus Disease 2019 (COVID-19)*, coordinated by Sarah A. Lister and Kavya Sekar.

³⁴ U.S. Congress, Senate Committee on Appropriations, Subcommittee on Departments of Labor, Health and Human Services, and Education, and Related Agencies, *Review of the FY2021 Budget Request for HHS*, Hearing to review the Fiscal Year 2021 funding request and budget justification for the U.S. Department of Health and Human Services, 116th Cong., February 25, 2020. See also Ted Hesson and Alexandra Alper, “Exclusive: U.S. Mulls Using Sweeping Powers to Ramp Up Production of Coronavirus Protective Gear,” Reuters.com, February 27, 2020, at <https://www.reuters.com/article/us-china-health-usa-production-exclusive/exclusive-u-s-mulls-using-sweeping-powers-to-ramp-up-production-of-coronavirus-protective-gear-idUSKCN20L2S0>.

³⁵ Section on “Health System Preparedness” in CRS Report R46219, *Overview of U.S. Domestic Response to Coronavirus Disease 2019 (COVID-19)*, coordinated by Sarah A. Lister and Kavya Sekar.

³⁶ 42 U.S.C. §300hh–10.

³⁷ FDA, “FDA’s Actions in Response to 2019 Novel Coronavirus at Home and Abroad,” February 14, 2020, at <https://www.fda.gov/news-events/press-announcements/fdas-actions-response-2019-novel-coronavirus-home-and-abroad>.

³⁸ House Committee on Oversight and Reform, “New Document Shows Inadequate Distribution of Personal Protective Equipment and Critical Medical Supplies to States,” press release, April 8, 2020, at <https://oversight.house.gov/news/press-releases/new-document-shows-inadequate-distribution-of-personal-protective-equipment-and>.

³⁹ Mariel Padilla, “‘It Feels Like a War Zone’: Doctors and Nurses Plead for Masks on Social Media,” *New York Times*, March 19, 2020, at <https://www.nytimes.com/2020/03/19/us/hospitals-coronavirus-ppe-shortage.html>.

⁴⁰ Catherine Thorbecke, “‘I’m Not Ready to Die’: New ‘Essential Workers’ Call for Protections, Hazard Pay in Coronavirus Crisis,” ABC News, April 17, 2020, at <https://abcnews.go.com/Business/im-ready-die-essential-workers-call-protections-hazard/story?id=70142602>.

⁴¹ Zoë Schlanger, “Begging for Thermometers, Body Bags, and Gowns: U.S. Health Care Workers Are Dangerously Ill-Equipped to Fight COVID-19,” *TIME*, April 20, 2020, at <https://time.com/5823983/coronavirus-ppe-shortage/>.

⁴² American College of Surgeons, *Other PPE Recommendations*, April 8, 2020, at <https://www.facs.org/covid-19/ppe/additional>.

as the lead federal agency coordinating the entire federal response to the pandemic.⁴³ Federal authorities established prior to the pandemic were utilized to procure and distribute PPE, including ASPR's Strategic National Stockpile (SNS).⁴⁴ However, FEMA and HHS determined that "the SNS alone could not fulfill all of our Nation's requirements," according to FEMA Administrator Peter Gaynor and Rear Admiral John Polowczyk, and developed new procedures during the COVID-19 pandemic response.⁴⁵

According to FEMA officials, FEMA began working with HHS and the Department of Defense (DOD) in March to assess and stabilize the PPE supply chain after forming the Supply Chain Task Force.⁴⁶ Rear Admiral John Polowczyk helped to lead the Task Force, which was staffed by members of FEMA, HHS, DOD, and several additional federal agencies.⁴⁷ The Supply Chain Task Force focused on a four-part effort to improve the PPE supply: preservation of PPE when possible, acceleration of PPE delivery, expansion of existing PPE production, and distribution of PPE to critical areas. Project Airbridge (see "**Project Airbridge**"), a federal effort to expedite private-sector delivery of PPE from manufacturers abroad to meet domestic needs, was part of this four-part strategy.⁴⁸

According to FEMA and DOD officials, the Supply Chain Task Force used multiple sources of data to gain visibility into the PPE supply chain, including

- **Requests for PPE** submitted by state, tribal, and territorial emergency managers receiving assistance to FEMA's National Response Coordinating Center (NRCC) and through FEMA's Public Assistance (PA) Program.⁴⁹
- **State, local, tribal, territorial, and medical provider data** consolidated by HHS and FEMA, through the FEMA National Response Coordination Center and the HHS Protect System, respectively.⁵⁰
- **Project Airbridge** data supplied by six major U.S. medical suppliers. Project Airbridge participants Cardinal Health, Concordance, Owens and Minor, McKesson, Medline, and Henry Schein agreed to furnish FEMA with each

⁴³ This transition was initiated as a result of the President's major disaster declaration for COVID-19. Submitted Testimony of FEMA Administrator Peter Gaynor and Rear Admiral John Polowczyk, in U.S. Congress, Senate Homeland Security and Governmental Affairs Committee, *Evaluating the Federal Government's Procurement and Distribution Strategies in Response to the COVID-19 Pandemic*, hearings, 116th Cong., 2nd sess., June 6, 2020, p. 3, at <https://www.hsgac.senate.gov/imo/media/doc/Testimony-Gaynor%20&%20Polowczyk-2020-06-09.pdf> (hereinafter, Gaynor and Polowczyk, HSGAC hearing).

⁴⁴ For more information, see CRS In Focus IF11574, *National Stockpiles: Background and Issues for Congress*, by G. James Herrera and Frank Gottron.

⁴⁵ Gaynor and Polowczyk, HSGAC hearing, p. 4.

⁴⁶ Gaynor and Polowczyk, HSGAC hearing, p. 5.

⁴⁷ Gaynor and Polowczyk, HSGAC hearing, p. 5.

⁴⁸ FEMA has used two spellings of this program: Project Airbridge and Project Air Bridge. This report refers to the program as "Project Airbridge," reflecting FEMA's most recent and consistent spelling of the program. However, citations that use other spellings (e.g., "Project Air Bridge") are reflected verbatim.

⁴⁹ Gaynor and Polowczyk, HSGAC hearing, p. 4.

⁵⁰ Gaynor and Polowczyk, HSGAC hearing, 11-12. See also HHS, "COVID-19 Guidance for Hospital Reporting and FAQs for Hospitals, Hospital Laboratory, and Acute Care Facility Data Reporting Updated July 29, 2020," at <https://www.hhs.gov/sites/default/files/covid-19-faqs-hospitals-hospital-laboratory-acute-care-facility-data-reporting.pdf%3C>; multiple FEMA, "FEMA Daily Ops Briefings, April, 2020"; and HHS, "HHS Protect: Frequently Asked Questions," July 20, 2020, at <https://www.hhs.gov/about/news/2020/07/20/hhs-protect-frequently-asked-questions.html>.

suppliers' data on inventory imported and distributed across the United States, not limited to Project Airbridge shipments.⁵¹

- Additional sources referenced in Supply Chain Task Force documents, including past manufacturing data, industry estimates, and demand data.⁵²

On the basis of these sources, the Supply Chain Task Force presented the charts summarized in **Table 1** to Senator Margaret Hassan, ranking member on the Senate Homeland Security and Governmental Affairs Committee's Subcommittee on Federal Spending Oversight and Emergency Management, in advance of a June 2020 hearing on federal COVID-19 response efforts. These charts documented the reported and forecasted shortfalls of supplies of N95 masks, medical gowns, surgical masks, nitrile gloves, and face shields during the pandemic through October 2020. The charts showed, broadly, that demand for these PPE materials were being met through a combination of domestic production (particularly for N95 respirators), overseas imports, and non-traditional suppliers.

Table 1 summarizes FEMA's assessment of PPE demands through October 2020 as presented to Congress in June 2020.

Table 1. Summary of FEMA PPE Demand Assessments

as presented by the Supply Chain Task Force in June 2020

PPE Type	Demand Met by End of Forecast Period? (Y/N)	Estimated Domestic Production
N95 Respirator Masks	Yes	High
Medical Gowns	No	Low
Surgical Masks	Yes	Low
Nitrile Gloves	Yes	Low / None
Face Shields	Yes	Low

Source: Tabulated by CRS from Supply Chain Task Force representative Rear Admiral John P. Polowczyk "White House COVID-19 Supply Chain Task Force," submitted to Senator Margaret Hassan in advance of hearing by U.S. Senate, Committee on Homeland Security and Governmental Affairs, *Evaluating the Federal Government's Procurement and Distribution Strategies in Response to the COVID-19 Pandemic*, June 9, 2020, at <https://www.hassan.senate.gov/imo/media/doc/SCTF%20Demand%20PPE%20Chart.pdf>.

Notes: The Supply Chain Task Force charts were current as of June 2020, according to FEMA. These data and graphics are produced by the COVID-19 Supply Chain Task Force. CRS cannot verify the accuracy of the data or explicate the methodology presented in these documents. According to the Supply Chain Task Force, the data does not include "procurement by states, commercial donations, distribution data of other medical-surgical distributors, direct shipments from manufacturers."

⁵¹ Gaynor and Polowczyk, HSGAC hearing, pp. 5-6; Submitted Testimony of Supply Chain Task Force representative Rear Admiral John Polowczyk, for U.S. Congress, House Select Subcommittee on the Coronavirus Crisis, *Federal Government's Efforts for Procurement and Distribution of Critical Medical Equipment and Supplies in Response to the COVID-19 Pandemic*, hearings, 116th Cong., 2nd sess., July 2, 2020, pp. 4-5, available at <https://docs.house.gov/meetings/VC/VC00/20200702/110851/HHRG-116-VC00-Wstate-PolowczykR-20200702.pdf>.

⁵² Supply Chain Task Force representative Rear Admiral John Polowczyk, "White House COVID-19 Supply Chain Task Force," submitted to Sen. Maggie Hassan in advance of hearing by U.S. Congress, Senate Committee on Homeland Security and Governmental Affairs, *Evaluating the Federal Government's Procurement and Distribution Strategies in Response to the COVID-19 Pandemic*, hearings, 116th Cong., 2nd sess., June 9, 2020, at <https://www.hassan.senate.gov/imo/media/doc/SCTF%20Demand%20PPE%20Chart.pdf>.

Although FEMA's assessments have conveyed confidence in U.S. capacity to meet PPE demands, independent reports document widespread and persistent PPE shortages.⁵³ These reports are supported by the listing of surgical gowns, gloves, and surgical respirators on the FDA's device shortages list. Pursuant to authorities established by the Coronavirus Aid, Relief, and Economic Security (CARES) Act (P.L. 116-136), FDA must maintain a public, up-to-date list of those devices that the agency has determined are or will be in shortage during a public health emergency declared by the HHS Secretary pursuant to Public Health Service Act Section 319.⁵⁴ PPE that meets the statutory definition of a medical device or "device" in the Federal Food, Drug and Cosmetic Act (FFDCA)—that is, PPE intended for a medical purpose—would be included on this list.⁵⁵ FDA, for the first time, published the device shortages list specific to COVID-19 on August 14, 2020. The list displays the FDA-specific product code and PPE type (e.g., surgical gown, examination gown) that is in shortage, as well as the reason for and estimated duration of the shortage, among other information.⁵⁶

To assist FDA with maintaining this list, manufacturers of devices critical to public health must—during or in advance of a public health emergency—notify FDA of any permanent discontinuance in the manufacture of the device or of any interruption in manufacturing that is likely to lead to a meaningful disruption in its U.S. supply.⁵⁷ Manufacturers can, but are not required to, notify FDA if they are experiencing an increase in demand that may result in a shortage. Based on these notifications and other relevant information, FDA is statutorily required to take certain actions to prevent or mitigate device shortages, including prioritizing and expediting review of regulatory submissions for marketing authorization and facility inspections.⁵⁸ Additional information about FDA regulation of PPE is provided in the section "FDA-Specific Actions."⁵⁹

As required by executive order, FDA also has taken steps to identify PPE need for potential future public health emergencies.⁶⁰ Specifically, on October 30, 2020, FDA published a list of essential

⁵³ See Shira Stein, Margaret Newkirk, and David R Baker, "Nurses' Pleas Spur U.S. Pledge to Tap 44 Million-Mask Stockpile," *Bloomberg*, July 31, 2020, at <https://www.bloomberg.com/news/articles/2020-07-31/nurses-pleas-spur-u-s-pledge-to-tap-44-million-mask-stockpile>; Andrew Jacobs, "Grave Shortages of Protective Gear Flare Again as Covid Cases Surge," *New York Times*, July 8, 2020, at <https://www.nytimes.com/2020/07/08/health/coronavirus-masks-ppe-doc.html>; William Wan, "America Is Running Short on Masks, Gowns and Gloves. Again," *Washington Post*, July 8, 2020, at <https://www.washingtonpost.com/health/2020/07/08/ppe-shortage-masks-gloves-gowns/>; Jessica Glenza, "PPE Shortage Could Last Years Without Strategic Plan, Experts Warn," *Kaiser Health News*, August 17, 2020, at <https://khn.org/news/ppe-shortage-could-last-years-without-strategic-plan-experts-warn/>; and National Nurses United, "National Nurse Survey Reveals Devastating Impact of Reopening Too Soon," press release, July 28, 2020, at <https://www.nationalnursesunited.org/press/national-nurse-survey-reveals-devastating-impact-reopening-too-soon>.

⁵⁴ 21 U.S.C. §356J(g), as added by §3121 of the CARES Act, referring to a public health emergency declared by the HHS Secretary pursuant to 42 U.S.C. §247d.

⁵⁵ PPE intended for non-medical (e.g., industrial) use does not meet the FFDCA definition of a device, and is not subject to FDA regulation or inclusion on the device shortages list.

⁵⁶ FDA, "Medical Device Shortages During the COVID-19 Public Health Emergency," at <https://www.fda.gov/medical-devices/coronavirus-covid-19-and-medical-devices/medical-device-shortages-during-covid-19-public-health-emergency#shortage>.

⁵⁷ 21 U.S.C. §356J(a), as added by §3121 of the CARES Act.

⁵⁸ 21 U.S.C. §356J(f), as added by §3121 of the CARES Act.

⁵⁹ Beyond these steps, non-governmental organizations have attempted to quantify PPE needs in the United States. For example, in April 2020, the Center for Health Security at the Johns Hopkins Bloomberg School of Public Health published a resource providing an initial estimate of the need for medical PPE above normal baseline utilization for a single 100-day COVID-19 wave. See E. Toner, "Interim Estimate of US PPE Needs for COVID-19," Center for Health Security at the Johns Hopkins Bloomberg School of Public Health, April 18, 2020, at <https://www.centerforhealthsecurity.org/resources/COVID-19/PPE/PPE-estimate.pdf>.

⁶⁰ Executive Order 13944, Combating Public Health Emergencies and Strengthening National Security by Ensuring, Essential Medicines, Medical Countermeasures, and Critical Inputs Are Made in the United States, August 6, 2020.

medicines, medical countermeasures (including PPE), and critical inputs “that are medically necessary to have available at all times in an amount adequate to serve patient needs.”⁶¹ As further directed by the executive order, FDA is coordinating with other federal agencies on strategies for acquiring the products on the list, accelerating domestic manufacturing, and identifying and addressing supply chain vulnerabilities.

Federal Actions to Increase PPE Supply

As part of the federal government’s response to the COVID-19 pandemic, the Trump Administration has sought to increase PPE production and distribution through a variety of agency actions as well as through utilization of the Defense Production Act.

FEMA Actions

Production

FEMA has publicly discussed two types of actions taken to increase domestic PPE production: (1) actions pursuant to the Defense Production Act (see below), and (2) actions taken to partner with private companies interested in committing resources to PPE manufacturing on a voluntary basis.⁶² Publicly available information on these partnerships remains limited.⁶³

Distribution

FEMA, HHS, and DOD have worked together to distribute PPE to states, tribes, and territories in several phases since FEMA assumed the position of lead federal agency for the federal COVID-19 response in March 2020.⁶⁴

⁶¹ FDA, “FDA Publishes List of Essential Medicines, Medical Countermeasures, Critical Inputs Required by Executive Order,” October 30, 2020, at <https://www.fda.gov/news-events/press-announcements/fda-publishes-list-essential-medicines-medical-countermeasures-critical-inputs-required-executive>.

⁶² Submitted Testimony of FEMA Administrator Peter Gaynor, U.S. Congress, House Committee on Oversight and Reform, *FEMA’s Natural Disaster Preparedness and Response Efforts During the Coronavirus Pandemic*, hearings, 116th Cong., 2nd sess., July 24, 2020, pp. 5-7 (hereinafter Gaynor Testimony, House Oversight, *FEMA’s Efforts During Pandemic*). See also FEMA, “COVID-19 Offer of Supplies or Equipment,” at <https://www.fema.gov/disasters/coronavirus/offers>; FEMA, “Use of Defense Production Act Authorities to Support the Pandemic Response,” March 19, 2020, at <https://www.fema.gov/fact-sheet/use-defense-production-act-authorities-support-pandemic-response>; and FEMA, “Applying the Defense Production Act,” news release, April 13, 2020, at <https://www.fema.gov/news-release/20200726/applying-defense-production-act>.

⁶³ Most recently, FEMA representatives reported that the “Stabilization Task Force is working through over 350 leads” on possible matches. Gaynor Testimony, House Oversight, *FEMA’s Efforts During Pandemic* pp. 5-6. Similar information is available at FEMA, “FEMA Supply Chain Task Force Leads Four-Pronged Approach to Securing Needed Supplies and Equipment in COVID-19 Fight,” July 26, 2020, at <https://www.fema.gov/news-release/20200726/fema-supply-chain-task-force-leads-four-pronged-approach-securing-needed>.

⁶⁴ FEMA assumed the position of the lead federal agency for the entire COVID-19 federal response efforts during the final weeks of March 2020. In congressional testimony, FEMA Administrator Peter Gaynor explained: “On March 19th, FEMA’s role in the pandemic response changed. Under the direction of the White House Coronavirus Task Force, FEMA moved from playing a supporting role in assisting [HHS], which was designated as the initial lead federal agency for the COVID-19 pandemic response, to coordinating the Whole-of-Government response to the COVID-19 pandemic,” submitted testimony, U.S. Congress, House Committee on Homeland Security, *Examining the National Response to the Worsening Coronavirus Pandemic Part II*, hearings, 116th Cong., 2nd sess., July 22nd, p. 3, available at <https://homeland.house.gov/imo/media/doc/Testimony%20-%20Gaynor.pdf> (hereinafter Gaynor testimony, House Homeland, *Examining National Response*).

According to FEMA, in the final weeks of March 2020, FEMA's National Response Coordination Center (NRCC) and HHS distributed the remaining PPE held in the HHS Strategic National Stockpile (SNS) to states, territories, and a few large cities in several allocations (see also "Stockpile Policy Options").⁶⁵ These allocations were initially made proportional to a jurisdiction's population, although FEMA reported that the final allocation was weighted by COVID-19 infection rates derived from Center for Disease Control (CDC) models.⁶⁶ Once the SNS PPE supply was exhausted, FEMA reported that the NRCC distributed PPE held by DOD for a limited period of time.⁶⁷

As both the SNS and DOD PPE supplies were exhausted, the newly formed Supply Chain Stabilization Task Force began acquiring new PPE and making distributions according to newly established procedures. According to FEMA, the agency exercised its authority to provide assistance directly (referred to as Direct Federal Assistance) to overwhelmed states, tribes, territories, local governments, and eligible private nonprofit organizations authorized to receive Public Assistance pursuant to declarations of Emergency and Major Disaster for COVID-19 under the Robert T. Stafford Disaster Relief and Emergency Assistance Act (the Stafford Act, as amended; P.L. 93-288).⁶⁸ In response to the COVID-19 pandemic, President Trump declared major disasters for all 50 states, five territories, one tribe, and the District of Columbia. This was the first instance in which major disasters were declared across the entire United States.⁶⁹

When Direct Federal Assistance is authorized, FEMA may task its own personnel or other federal agencies, such as HHS and the CDC, to perform work eligible for Public Assistance on behalf of the requesting applicants (referred to as "mission assignments").⁷⁰ According to FEMA, the agency exercised this authority in order to procure and distribute PPE directly to nonfederal entities.⁷¹

FEMA entered into a memorandum of understanding (MOU) with the HHS Assistant Secretary for Preparedness Response (ASPR) in April 2020 that enabled FEMA to acquire and distribute critical medical supplies, including PPE, through the SNS.⁷² The MOU called for the ASPR to

⁶⁵ The SNS is a federal cache of drugs, vaccines, and medical supplies purchased by the federal government to assist in civilian disaster response. It is managed by the HHS Assistant Secretary for Preparedness and Response, after previously being managed by CDC. See HHS, "Strategic National Stockpile," at <https://www.phe.gov/about/sns/Pages/default.aspx>; FEMA, phone briefing with House Committee on Homeland Security, House Committee on Oversight and Reform, and CRS, June 18, 2020; and U.S. Government Accountability Office (GAO), *COVID-19: Opportunities to Improve Federal Response and Recovery Efforts*, GAO-20-625, June 25, 2020, pp. 20-23, available at <https://www.gao.gov/reports/GAO-20-625/> (hereinafter GAO, *COVID-19: Opportunities*).

⁶⁶ GAO, *COVID-19: Opportunities*, pp. 108-100; FEMA, phone briefing with House Committee on Homeland Security, House Committee on Oversight and Reform, and CRS, June 18, 2020.

⁶⁷ FEMA, "FEMA Coronavirus (COVID-19) Pandemic Response," March 22, 2020, p. 1, provided to CRS by FEMA Office of Congressional and Legislative Affairs; FEMA, "National Resource Prioritization Cell," phone briefing with House Committee on Homeland Security, House Committee on Oversight and Reform, and CRS, June 18, 2020.

⁶⁸ 42 U.S.C. §§5121 et seq. "Public Assistance—Direct Federal Assistance" is authorized in Stafford Act Sections 402 and 502; 42 U.S.C. §§5170a and 5192. See also 44 C.F.R. §206.208. For a list of the Stafford Act declarations authorizing public assistance for COVID-19, see FEMA, "COVID-19 Disaster Declarations," at <https://www.fema.gov/disasters/coronavirus/disaster-declarations>.

⁶⁹ For a list of the Stafford Act declarations authorizing public assistance for COVID-19, see FEMA, "COVID-19 Disaster Declarations," at <https://www.fema.gov/disasters/coronavirus/disaster-declarations>.

⁷⁰ See FEMA, "Mission Assignments," at <https://www.fema.gov/federal-agencies/mission-assignments>.

⁷¹ Email from FEMA Congressional and Legislative Affairs to CRS, June 19, 2020.

⁷² FEMA and HHS, "Memorandum of Understanding Between the Federal Emergency Management Agency and the Department of Health and Human Services, Office of Assistant Secretary for Preparedness Response," executed April 5, 2020, provided to CRS by FEMA Office of Congressional and Legislative Affairs. Available to Congressional members and staff upon request.

reimburse FEMA for the cost of acquired materials, as specified in subsequent interagency agreements through June 13, 2020.⁷³ According to FEMA, this MOU and subsequent interagency agreements enabled FEMA to procure and distribute PPE directly to states, tribes, territories, local governments, and nonprofits without a nonfederal cost share. PPE supplies purchased after June 13, 2020, and fulfilled with FEMA support may be subject to the 25% nonfederal cost share for Public Assistance as authorized under the Stafford Act declarations for COVID-19.⁷⁴ FEMA indicated that procurement activities were transitioned to the Defense Logistics Agency (DLA) on May 29, 2020.⁷⁵ In a separate effort in April 2020, FEMA provided a two-week supply of PPE to 15,400 Medicare and Medicaid-certified nursing homes.⁷⁶

PPE allocation was the responsibility of the National Resource Prioritization Cell, a decisionmaking entity established within the COVID-19 Supply Chain Task Force.⁷⁷ The Prioritization Cell utilized demographic data, federal supply data, private sector supply chain data, and medical data supplied by states and health care providers to determine PPE distribution priority areas over a 96-hour period.⁷⁸ According to the Trump Administration, these data sources fed into the HHS-based data systems which was shared with FEMA, HHS, the White House Coronavirus Task Force, and ASPR for response efforts that included resource allocation.⁷⁹ According to FEMA, medical data was analyzed every seven days, and included “confirmed cases, increases in confirmed cases, total mortality, and increases in mortality over seven days.”⁸⁰

Despite the federal efforts, PPE shortages continued to be reported into the summer and fall of 2020.⁸¹ In September, the GAO reported that the federal government delivered more than 428 million units of PPE through September 1 (see **Table 2**). However, continued PPE shortages suggest that federal deliveries have not been able to meet total demand posed by the pandemic.

⁷³ Ibid; FEMA, “Coronavirus Pandemic Response: Summary of Cost Share by Shared Resources,” September 17, 2020, available at <https://www2.illinois.gov/iema/LocalEMA/Documents/PAforms/COVID-19-CostShare.pdf>.

⁷⁴ Ibid.

⁷⁵ Gaynor Testimony, House Oversight, *FEMA’s Efforts During Pandemic*, p. 6.

⁷⁶ FEMA, “Personal Protective Equipment for Medicare and Medicaid Nursing Homes,” April 30, 2020, at <https://www.fema.gov/news-release/20200727/personal-protective-equipment-medicare-and-medicare-nursing-homes>.

⁷⁷ FEMA, “Coronavirus (COVID-19) Pandemic: National Resource Prioritization Cell,” updated May 17, 2020, at <https://www.fema.gov/fact-sheet/coronavirus-covid-19-pandemic-national-resource-prioritization-cell> (hereinafter FEMA, “National Resource Prioritization Cell”).

⁷⁸ Oral Testimony, Rear Admiral John Polowczyk, *Evaluating the Federal Government’s Procurement and Distribution Strategies in Response to the COVID-19 Pandemic*, hearing, 116th Cong., 2nd sess., June 9, 2020; FEMA, “National Resource Prioritization Cell.”

⁷⁹ Gaynor and Polowczyk, HSGAC hearing, pp. 11-12. See also HHS, “COVID-19 Guidance for Hospital Reporting and FAQs for Hospitals, Hospital Laboratory, and Acute Care Facility Data Reporting,” updated July 10, 2020, at <https://www.hhs.gov/sites/default/files/covid-19-faqs-hospitals-hospital-laboratory-acute-care-facility-data-reporting.pdf>; and CDC, “National Healthcare Safety Network (NHSN),” at <https://www.cdc.gov/nhsn/covid19/index.html>; new guidance appears at HHS, “COVID-19 Guidance for Hospital Reporting and FAQs for Hospitals, Hospital Laboratory, and Acute Care Facility Data Reporting,” updated July 29, 2020, at <https://www.hhs.gov/sites/default/files/covid-19-faqs-hospitals-hospital-laboratory-acute-care-facility-data-reporting.pdf%3C>. See also CRS Report R46588, *Tracking COVID-19: U.S. Public Health Surveillance and Data*, by Kavya Sekar and Angela Napili.

⁸⁰ FEMA, “National Resource Prioritization Cell.”

⁸¹ See Andrew Jacobs, “Grave Shortages of Protective Gear Flare Again as Covid Cases Surge,” *New York Times*, July 8, 2020, at <https://www.nytimes.com/2020/07/08/health/coronavirus-masks-ppe-doc.html>; Jessica Contrera, “The N95 Shortage America Can’t Seem to Fix,” *Washington Post*, September 21, 2020, at <https://www.washingtonpost.com/graphic/2020/local/news/n-95-shortage-covid/>; and Helena Oliviero, “Months into Pandemic, PPE Shortage Persists,” *Atlanta Journal-Constitution*, October 7, 2020, at <https://www.ajc.com/news/coronavirus/months-into-pandemic-ppe-shortage-persists/6OMYNYLDV5GJ5EBEMOSPWEC6MA/>.

Table 2. PPE Units Distributed by U.S. Government

Through September 1, 2020 (in millions)

	N95 Respirators	Face Masks	Gloves*	Nonsurgical Gowns
Units Distributed	92.4	228.4 million	79.7	28.1

Source: GAO, *COVID-19: Federal Efforts Could be Strengthened by Timely and Concerted Actions*, GAO-20-701, September 2020, p. 136.

Congressional Concerns with Federal PPE Distribution Efforts

Some Members of Congress have raised concerns about the federal government’s PPE procurement and distribution procedures as well as persistent PPE supply shortages.⁸² News sources have also documented many cases in which federally procured and distributed PPE was found to be expired, damaged, or otherwise faulty.⁸³

Additionally, early in the pandemic response, state and territorial representatives criticized federal PPE supply chain management, stating that PPE procurement efforts “pitted states against one another and other purchasers—including the federal government....”⁸⁴ In September 2020, the GAO found that seven of eight states interviewed about PPE supplies found that this situation had improved since the onset of the pandemic.⁸⁵

Congress has also questioned the lack of transparency surrounding federal PPE distribution efforts. Congressional concerns include, but are not limited to, the following questions:

- Which authorities, offices, and/or personnel made decisions about changes in management of the SNS during the pandemic? When were these decisions made, and what methodology is employed?⁸⁶
- What methodology informs federal PPE allocation and distribution priorities,⁸⁷ including data analysis and model design? Publicly available information on this methodology remains limited.

⁸² See, for example, Sens. Warren, Blumenthal, and Schumer, Letter to Pandemic Response Accountability Committee Chair Michael Horowitz, June 8, 2020, at <https://www.warren.senate.gov/imo/media/doc/Letter%20to%20PRAC%20re%20project%20airbridge%202020.06.pdf>; and Sen. Lankford and Sen. Johnson, public statements in U.S. Senate, Committee on Homeland Security and Governmental Affairs, *Evaluating the Federal Government’s Procurement and Distribution Strategies in Response to the COVID-19 Pandemic*, hearing, 116th Cong., 2nd sess., June 9, 2020.

⁸³ See, for example, Andrew Jacobs, “FEMA Sends Faulty Protective Gear to Nursing Homes Battling Virus,” *New York Times*, July 24, 2020, at <https://www.nytimes.com/2020/07/24/health/coronavirus-nursing-homes-PPE.html>.

⁸⁴ National Governor’s Association, Memorandum, Governor Actions to Address PPE and Ventilator Shortages,” April 13, 2020, p. 1, at <https://www.nga.org/wp-content/uploads/2020/04/NGA-Medical-Equipment-Memo.pdf>.

⁸⁵ GAO, *COVID-19: Federal Efforts*, p. 13. The GAO conducted interviews in July and August 2020 with California, Colorado, Idaho, Massachusetts, Nebraska, New Jersey, New Mexico, and South Carolina. GAO, *COVID-19: Federal Efforts*, p. 141.

⁸⁶ Oral Testimony, Chairman of the Senate Homeland Security and Governmental Affairs Committee Ron Johnson, *Evaluating the Federal Government’s Procurement and Distribution Strategies in Response to the COVID-19 Pandemic*, hearing, 116th Cong., 2nd sess., June 9, 2020.

⁸⁷ See, for example, Chairman of House Committee on Homeland Security Bennie Thompson, letter to DHS Acting Secretary Chad Wolf and HHS Secretary Alex Azar, March 23, 2020, p. 4, at <https://homeland.house.gov/imo/media/doc/DHS%20HHS%20PPE%20Letter.pdf>, and Senator Tammy Baldwin, Letter to President Trump, April 13, 2020, at (continued...)

- What specific data elements and data sources were utilized by the National Resource Prioritization Cell to inform federal PPE allocation and distribution priorities?⁸⁸
- What assumptions and risk assessments were used in the models to determine PPE allocations, and how were the models validated?⁸⁹
- How did the National Resource Prioritization Cell define “hot spots” whose PPE demands were prioritized in Project Airbridge and federal PPE distribution efforts?⁹⁰
- Which specific offices and/or personnel make up the Supply Chain Task Force, and the National Resource Prioritization Cell, and determine allocation methodology, data model design, and resource allocations?⁹¹
- How were state, territorial, and tribal requests for PPE assessed, and why were many recipients not aware of how and when requests for PPE from the federal government would be fulfilled?⁹²
- When is PPE distributed by the federal government subject to a nonfederal cost share, given the varying sources and authorities through which federal PPE supplies are distributed?⁹³

The domestic supply and distribution of PPE remain a source of ongoing congressional interest, despite reported improvements.

FEMA, ASPR, and other members of the Supply Chain Advisory Group (the successor of the Supply Chain Task Force)⁹⁴ have also reported improvements in the national PPE supply.⁹⁵ Additionally, GAO found that eight states interviewed regarding PPE supplies in July and August 2020 were rebuilding 30-day PPE stockpiles in preparation for future surges of COVID-19.⁹⁶

https://www.baldwin.senate.gov/imo/media/doc/2020%2004%2013%20STB%20letter%20to%20POTUS%20on%20failing%20to%20act_final%20FINAL.pdf.

⁸⁸ See, for example, Rep. Sean Casten to FEMA Regional Administrator James Joseph, April 7, 2020, at <https://casten.house.gov/sites/casten.house.gov/files/2020-04-07%20Casten%20FEMA%20Questions%20FINAL.pdf>.

⁸⁹ Rep. Sean Casten to FEMA Regional Administrator James Joseph, April 7, 2020, at <https://casten.house.gov/sites/casten.house.gov/files/2020-04-07%20Casten%20FEMA%20Questions%20FINAL.pdf>.

⁹⁰ Senator Tammy Baldwin, Letter to President Donald J. Trump, April 13, 2020, at https://www.baldwin.senate.gov/imo/media/doc/2020%2004%2013%20STB%20letter%20to%20POTUS%20on%20failing%20to%20act_final%20FINAL.pdf.

⁹¹ Chairman of House Committee on Homeland Security Bennie Thompson and Chairwoman of House Committee on Oversight Carolyn Maloney, Letter to FEMA Administrator Peter Gaynor, April 7, 2020, at <https://homeland.house.gov/imo/media/doc/040720%20Joint%20FEMA%20letter%20re%20PPE.pdf>.

⁹² GAO, *COVID-19: Federal Efforts*, pp. 20-21.

⁹³ Ibid.

⁹⁴ As of June 15, 2020, the Supply Chain Task Force became known as the Advisory Group, and is part of a reorganization off the original eight task forces in the Unified Coordination Group. FEMA and HHS lead the Unified Coordination Group, which was established to coordinate the federal response to COVID-19. The GAO explains: “[t]he two groups [the Supply Chain Task Force and the Advisory Group] generally have similar roles and are led by the same official, Rear Admiral John Polowczyk, an expert in logistics planning and execution on detail from DOD’s Joint Chiefs of Staff, and include officials from FEMA and HHS. According to DOD, the Supply Chain Task Force was the primary federal body coordinating and managing supply chain responsibilities. In contrast, the Advisory Group has an advisory and assistance role, focused on transitioning responsibilities to other federal stakeholders.” GAO, *COVID-19: Federal Efforts*, p. 11.

⁹⁵ GAO, *COVID-19: Federal Efforts*, p. 13.

⁹⁶ GAO, *COVID-19: Federal Efforts*, p. 13. GAO conducted interviews in July and August 2020 with California, Colorado, Idaho, Massachusetts, Nebraska, New Jersey, New Mexico, and South Carolina. Ibid., p. 141.

However, industry reports indicate that these replenished state stockpiles are expensive, challenging to maintain, and difficult to build during the ongoing real-time demand for PPE within their jurisdiction.⁹⁷ Additionally, states continue to express a need for access to SNS supplies during the pandemic, and are unsure whether federally supplied PPE may be available during future COVID case surges (for more information on nonfederal PPE stockpiles, see “Stockpile Policy Options”).⁹⁸ Finally, the GAO reported in September 2020 that PPE shortages persist nationwide.⁹⁹ FEMA Administrator Peter Gaynor acknowledged the ongoing shortages in July 2020, saying “we have a ways to go in making sure we have enough PPE.”¹⁰⁰

Project Airbridge

As noted above, one prong of the four-pronged effort by the Supply Chain Task Force was the acceleration of PPE delivery in the United States. FEMA reported that, at the onset of the pandemic, PPE purchased on the private market was generally delivered after 30-40 days via marine transport.¹⁰¹ In late March, the Supply Chain Task Force launched Project Airbridge in order to accelerate the transport of commercially-owned PPE from overseas manufacturing facilities to the United States and thereby increase available domestic supply. FEMA reported that the air bridge reduced transport time from 37 days to 24 hours.¹⁰²

Under Project Airbridge, FEMA entered into agreements with the six leading medical suppliers in the United States: Cardinal Health, Concordance, Owens & Minor, McKesson, Medline, and Henry Schein.¹⁰³ Under these agreements, the federal government assumed responsibility for transporting PPE cargo owned or ordered by the six suppliers from specified locations abroad to the United States.¹⁰⁴ Project Airbridge memoranda of agreement between FEMA and Cardinal, McKesson, and Medline are publicly available.¹⁰⁵ According to these agreements, participating

⁹⁷ Jay Greene, “Hospitals Say They’re Better Prepared with PPE Than Spring, but Supply Chain Uncertain,” *Modern Healthcare*, October 25, 2020, at <https://www.modernhealthcare.com/supply-chain/hospitals-say-theyre-better-prepared-ppe-spring-supply-chain-uncertain> and GAO, *COVID-19: Federal Efforts*, pp. 138-140.

⁹⁸ *Ibid.*

⁹⁹ GAO, *COVID-19: Federal Efforts*, p. 10.

¹⁰⁰ Oral Testimony, FEMA Administrator Peter Gaynor, U.S. Congress, House Committee on Homeland Security, *Examining the National Response to the Worsening Coronavirus Pandemic Part II*, hearings, 116th Cong., 2nd sess., July 22, 2020.

¹⁰¹ FEMA, “Phasing Out Project Airbridge,” news release, June 17, 2020, at <https://www.fema.gov/news-release/20200726/fema-phasing-out-project-airbridge>; Submitted Testimony, FEMA Administrator Peter Gaynor, U.S. Congress, House Committee on Homeland Security, *Examining the National Response to the Worsening Coronavirus Pandemic Part II*, hearings, 116th Cong., 2nd sess., July 22, 2020, p. 7.

¹⁰² Gaynor Testimony, House Oversight, *FEMA’s Efforts During Pandemic*, p. 5.

¹⁰³ FEMA, “FEMA COVID-19 Supply Chain Task Force: Supply Chain Stabilization,” April 7, 2020, at <https://www.fema.gov/news-release/20200725/fema-covid-19-supply-chain-task-force-supply-chain-stabilization>; participants are listed in Sens. Warren, Blumenthal, and Schumer, Letter to Pandemic Response Accountability Committee Chair Michael Horowitz, June 8, 2020, p.1, at <https://www.warren.senate.gov/imo/media/doc/Letter%20to%20PRAC%20re%20project%20airbridge%202020.06.pdf>. See also Department of Justice, “Department of Justice Issues Business Review Letter to Medical Supplies Distributors Supporting Project Airbridge Under Expedited Procedure for COVID-19 Pandemic Response,” April 4, 2020, at <https://www.justice.gov/opa/pr/departement-justice-issues-business-review-letter-medical-supplies-distributors-supporting>.

¹⁰⁴ See, for example, Memorandum of Agreement (MOA) between the Department of Homeland Security Federal Emergency Management Agency (DHS/FEMA) and Cardinal Health 200, LLC. Found on p. 6 of “Cardinal Response,” hosted on Senator Elizabeth Warren, “Warren, Schumer, Blumenthal Release New Findings and Documents from Investigation of Trump-Kushner ‘Project Air Bridge’ Coronavirus Response,” at <https://www.warren.senate.gov/download/cardinal-response-051320>.

¹⁰⁵ Memoranda of Agreement between FEMA and Cardinal, FEMA and McKesson, and FEMA and Medline are (continued...)

suppliers agreed to deliver 50% of the PPE units transported via the air bridge to customers within COVID-19 priority counties (“hot spots”¹⁰⁶), as determined by the National Resource Prioritization Cell.¹⁰⁷ The remaining 50% of transported cargo feeds into distributors’ normal supply chain to customers across the country.¹⁰⁸ As noted earlier in this report, publicly available information on the methodology to determine priority counties is limited.¹⁰⁹ When the program was suspended on June 30, 2020, FEMA reported that 249 Project Airbridge flights had transported the volume of PPE documented below in **Table 3**.¹¹⁰

Congress has raised questions regarding the operation and success of Project Airbridge. FEMA reported that the air bridge was suspended at the end of June 2020 because private manufacturers and distributors have increased domestic production and international manufacturing capacity, and are using more maritime resources to bring in supplies.¹¹¹ However, the GAO found that as of September 2020, states remained unable to fulfill local requests for certain types of PPE,¹¹² and FEMA’s news releases on Project Airbridge indicated that the program facilitated transport only of a fraction of PPE shipments to the United States (see **Figure 2**). Additionally, some members of Congress have raised concerns with the program, including but not limited to: the delivery of too few supplies (particularly N95 respirators), the reported involvement of volunteer, private-sector employees in operating the federal initiative, federal pressure for Project Airbridge participants to procure PPE from a particular manufacturer, high prices of transported PPE, and the ability of private-sector partners to determine the recipient of transported PPE.¹¹³

available at Sen. Warren, “Warren, Schumer, Blumenthal Release New Findings and Documents from Investigation of Trump-Kushner ‘Project Air Bridge’ Coronavirus Response,” at <https://www.warren.senate.gov/imo/media/doc/Cardinal%20response%2005.13.20.pdf>; at <https://www.warren.senate.gov/imo/media/doc/McKesson%20response%2005.13.20.pdf>; at <https://www.warren.senate.gov/imo/media/doc/Medline%20response%2005.13.20.pdf>.

¹⁰⁶ FEMA, “FEMA COVID-19 Supply Chain Task Force: Supply Chain Stabilization,” April 7, 2020, at <https://www.fema.gov/news-release/20200725/fema-covid-19-supply-chain-task-force-supply-chain-stabilization>.

¹⁰⁷ *Ibid.*, p. 6-7; See also FEMA, “Coronavirus (COVID-19) Pandemic: National Resource Prioritization Cell,” updated May 17, 2020, at <https://www.fema.gov/fact-sheet/coronavirus-covid-19-pandemic-national-resource-prioritization-cell>; FEMA, phone briefing with House Committee on Homeland Security, House Committee on Oversight and Reform, and CRS, June 18, 2020.

¹⁰⁸ FEMA, “FEMA COVID-19 Supply Chain Task Force: Supply Chain Stabilization,” April 7, 2020, at <https://www.fema.gov/news-release/20200725/fema-covid-19-supply-chain-task-force-supply-chain-stabilization>.

¹⁰⁹ The most detailed publicly available explanation is available at Rear Admiral Polowczyk, oral testimony, U.S. Congress, House Select Subcommittee on the Coronavirus Crisis, *The Administration’s Efforts to Procure, Stockpile, and Distribute Critical Supplies*, 116th Cong., 2nd sess., July 2, 2020, at <https://coronavirus.house.gov/subcommittee-activity/hearings>, and FEMA, “National Resource Prioritization Cell.”

¹¹⁰ Per one Project Air Bridge MOA (publicly available on Senator Warren’s website), “Company agrees to take possession of the Transported PPE shipped at Government’s expense at the point of arrival (i.e., the airport).” See, for example, MOA between the Department of Homeland Security Federal Emergency Management Agency (DHS/FEMA) and Cardinal Health 200, LLC. Quote at p. 7 of “Cardinal Response,” hosted by Senator Elizabeth Warren, “Warren, Schumer, Blumenthal Release New Findings and Documents from Investigation of Trump-Kushner ‘Project Air Bridge’ Coronavirus Response,” at <https://www.warren.senate.gov/download/cardinal-response-051320>.

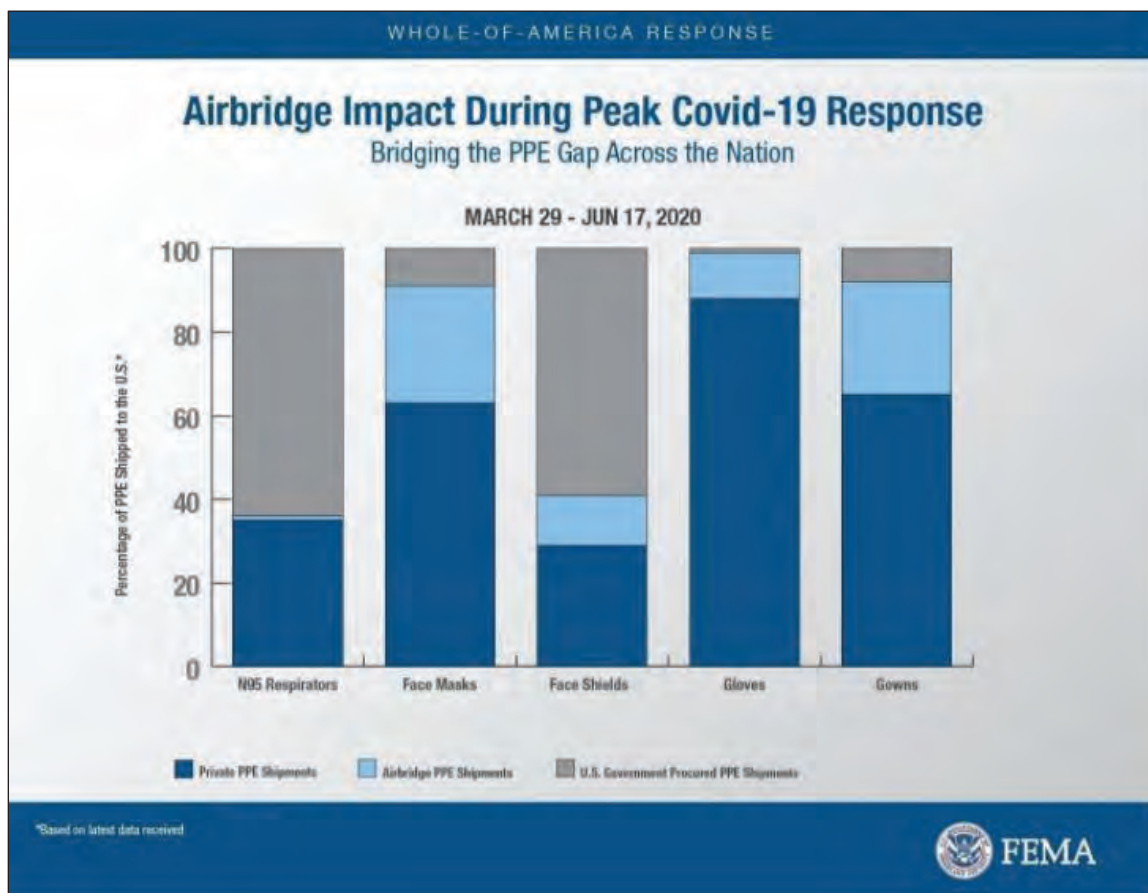
¹¹¹ GAO, *COVID-19: Federal Efforts*, p. 11, n. 16.

¹¹² *Ibid.*, 15.

¹¹³ Senator Elizabeth Warren, Charles Schumer, and Richard Blumenthal, Letter to Pandemic Response Accountability Committee, June 8, 2020, at <https://www.warren.senate.gov/imo/media/doc/Letter%20to%20PRAC%20re%20project%20airbridge%202020.06.pdf>; Chairwoman of House Committee on Oversight and Reform Carolyn B. Maloney, Memorandum on “Information Provided by Medical Distribution Companies on Challenges with White House Supply Chain Task Force and Project Airbridge,” July 2, 2020, at <https://oversight.house.gov/sites/democrats.oversight.house.gov/files/documents/Project%20Airbridge%20Memo%2007-02-20.pdf>.

Figure 2. PPE Shipment During Project Airbridge

According to FEMA, March 29-June 17, 2020



Source: FEMA, "FEMA Phasing Out Project Airbridge," June 17, 2020.

Table 3. PPE Units Transported Through Project Airbridge

as reported by FEMA, March-June 30, 2020 (in millions)

	N95 Respirators	Surgical Masks	Gloves	Surgical Gowns	Face Shields
Units Delivered	Nearly 1.5	125.4	937.0	66.8	2.7

Source: FEMA, "Weekly Update: Coronavirus Pandemic Whole-of-America Response," Tuesday, July 7, 2020, at https://www.usetinc.org/wp-content/uploads/2020/07/ESF-15_WeeklyByTheNumbers_20200707-FINAL.pdf; and FEMA, "Phasing Out Project Airbridge," news release, June 17, 2020.

Notes: CRS cannot verify their accuracy as FEMA is the sole source of the information. Project Airbridge also transported other cargo, including stethoscopes, coveralls, and thermometers. Domestic distribution for products transported through Project Airbridge is the responsibility of the medical suppliers. Numbers of N-95 respirators delivered through Project Airbridge may vary across sources. Numbers of N-95 respirators reported here reflect data in FEMA, "Phasing Out Project Airbridge," which FEMA indicated should be cited in an email to CRS, September 16, 2020.

HHS and FDA Actions

Despite increased demand earlier this year, some mask manufacturers—as the largest domestic PPE producers—signaled reluctance to increase domestic manufacturing capacity, citing the risk of creating excess supply in the face of falling demand following a successful pandemic response.¹¹⁴ To address such concerns, HHS awarded guaranteed contracts to five companies to incrementally purchase approximately 600 million N95 respirators to be delivered to the Strategic National Stockpile (SNS) over 18 months.¹¹⁵

According to HHS, this type of contract “supports long-term production while encouraging manufacturers to increase production of N95 respirators now—with the guarantee that they will not be left with excess supplies if private sector orders are cancelled once the COVID-19 response subsides.”¹¹⁶ Importantly, these contracts allow the manufacturers to fill private sector orders before the SNS order.

In addition, Congress authorized the HHS Secretary to waive most liability and to compensate eligible individuals who suffer injuries from administration or use of these products, whether used for the COVID-19 response or any other public health emergency.¹¹⁷

FDA-Specific Actions

FDA regulates PPE intended for medical use (e.g., surgical masks, N95 respirators, medical gowns and gloves) as a medical device.¹¹⁸ PPE intended for nonmedical (e.g., industrial) use is not considered a medical device and is therefore not subject to FDA regulatory requirements.¹¹⁹

Under most circumstances, a producer interested in manufacturing a medical device for the U.S. market would need FDA permission, which is often obtained through premarket notification (i.e., 510(k) clearance). To receive clearance, the manufacturer must submit to FDA—at least 90 days prior to marketing—a 510(k) submission demonstrating that the proposed device is substantially equivalent to (i.e., as safe and effective as) a device already on the market.¹²⁰ In addition, there are certain circumstances under which a change to an already cleared device would require a new

¹¹⁴ Mike Bowen C.E.O. of Prestige Ameritech, quoted in Siddhartha Mukherjee, “What the Coronavirus Crisis Reveals About American Medicine,” *The New Yorker*, April 27, 2020, at <https://www.newyorker.com/magazine/2020/05/04/what-the-coronavirus-crisis-reveals-about-american-medicine>.

¹¹⁵ HHS, “HHS to Procure N95 Respirators to Support Healthcare Workers in COVID-19 Outbreaks,” press release, March 4, 2020, at <https://www.hhs.gov/about/news/2020/03/04/hhs-to-procure-n95-respirators-to-support-healthcare-workers-in-covid-19-outbreaks.html>.

¹¹⁶ HHS, “Procurement of N95 Respirators,” at <https://www.phe.gov/emergency/events/COVID19/SNS/Pages/procurement.aspx>, accessed August 4, 2020.

¹¹⁷ See §3103 of the CARES Act. For more information, see also CRS Report R46334, *Selected Health Provisions in Title III of the CARES Act (P.L. 116-136)*, coordinated by Elayne J. Heisler.

¹¹⁸ Under the Federal Food, Drug and Cosmetic Act (FFDCA) §201(h) (21 U.S.C. §321(h)), these products are devices when intended for use in the diagnosis of disease or other conditions or in the cure, mitigation, treatment, or prevention of disease.

¹¹⁹ FDA, “Face Masks and Surgical Masks for COVID-19: Manufacturing, Purchasing, Importing, and Donating Masks During the Public Health Emergency,” updated May 11, 2020, at <https://www.fda.gov/medical-devices/personal-protective-equipment-infection-control/face-masks-and-surgical-masks-covid-19-manufacturing-purchasing-importing-and-donating-masks-during>.

¹²⁰ FFDCA §510(k) (21 U.S.C. §360(k)). FDA, Premarket Notification 510(k), at <https://www.fda.gov/medical-devices/premarket-submissions/premarket-notification-510k>.

510(k) submission. According to FDA guidance, such changes include those involving labeling, technology, and/or materials used.¹²¹

Specific premarket and other regulatory requirements vary depending on the type of PPE. For example, medical gloves must receive 510(k) FDA clearance prior to marketing. Conversely, many respirators intended for use in the health care setting, such as surgical N95s, are subject to certification and approval by the National Institute for Occupational Safety and Health (NIOSH), an institute of the CDC.¹²² While NIOSH, rather than FDA, generally reviews and approves surgical N95s in the premarket phase,¹²³ these products are still subject to other FDA regulatory requirements once on the market (e.g., current good manufacturing practices (CGMPs)).¹²⁴ Respirators intended for non-medical use (e.g., N95s for industrial uses) are subject to NIOSH requirements, but not FDA oversight.

During the COVID-19 pandemic, FDA has taken steps to address concerns about the availability of respirators and other critical PPE. While FDA cannot compel firms to make specific medical products, the agency has enabled access to non-FDA-cleared devices by granting emergency use authorizations (EUA). FDA may grant an EUA for use of an unapproved medical product or the unapproved use of an approved product under certain circumstances.¹²⁵ FDA has issued several EUAs allowing the distribution and official medical use (not limited to treating COVID-19 patients) of certain NIOSH-approved respirators typically not used for medical purposes (e.g., preventing transmission of infection). EUAs were also issued for certain imported respirators that are not FDA-cleared or NIOSH-approved and systems for decontaminating respirators intended for single use.¹²⁶ PPE that is authorized under an EUA must comply with the conditions of authorization, including labeling and adverse event reporting, but is generally exempt from 510(k) clearance, registration requirements, and in some cases, certain CGMPs. Under normal circumstances, distributing these devices without complying with these requirements would be a violation of the FFDCA and FDA regulations, and subject to enforcement action.

To further expand availability of PPE during the COVID-19 pandemic, FDA has issued enforcement policies further describing the conditions under which producers may manufacture and distribute PPE without clearance or registration¹²⁷ for the duration of the declared public

¹²¹ FDA, “Deciding When to Submit a 510(k) for a Change to an Existing Device,” Guidance for Industry and Food and Drug Administration Staff, October 2017, at <https://www.fda.gov/media/99812/download>.

¹²² FDA, “N95 Respirators, Surgical Masks, and Face Masks,” at <https://www.fda.gov/medical-devices/personal-protective-equipment-infection-control/n95-respirators-surgical-masks-and-face-masks>. See also Memorandum of Understanding (MOU) 225-18-006, *MOU Between the Food & Drug Administration/Center for Devices & Radiological Health and the Centers For Disease Control & Prevention/National Institute for Occupational Safety & Health/National Personal Protective Technology Laboratory*, November 2017, at <https://www.fda.gov/about-fda/domestic-mous/mou-225-18-006>.

¹²³ Devices that exceed threshold evaluation criteria (e.g., specific disease and/or infection prevention) would also be subject to 510(k) requirements. For more information, see MOU 225-18-006, *Memorandum of Understanding Between the Food & Drug Administration/Center for Devices & Radiological Health and the Centers for Disease Control & Prevention/National Institute for Occupational Safety & Health/National Personal Protective Technology Laboratory*, November 2017, at <https://www.fda.gov/about-fda/domestic-mous/mou-225-18-006>.

¹²⁴ FDA has promulgated CGMP regulations for devices through the quality system (QS) regulation (21 C.F.R. Part 820).

¹²⁵ FFDCA §564 (21 U.S.C. §360bbb-3). See also CRS In Focus IF10745, *Emergency Use Authorization and FDA’s Related Authorities*, by Agata Bodie.

¹²⁶ FDA, “Personal Protective Equipment EUAs,” updated July 31, 2020, at <https://www.fda.gov/medical-devices/coronavirus-disease-2019-covid-19-emergency-use-authorizations-medical-devices/personal-protective-equipment-euas>.

¹²⁷ FDA, “Enforcement Policy for Face Masks and Respirators During the Coronavirus Disease (COVID-19) Public (continued...) ”

health emergency.¹²⁸ These enforcement policies have often been issued in tandem with EUAs, but FDA has noted that certain products can be authorized for marketing under the conditions laid out in the enforcement policies rather than an EUA.¹²⁹ However, PPE marketed under an existing enforcement policy rather than an EUA may not receive legal liability protections under the Public Readiness and Emergency Preparedness (PREP) Act.¹³⁰ For example, certain surgical gowns authorized under FDA's enforcement policy are not covered under the EUA for surgical gowns and other apparel.¹³¹

While FDA's actions have allowed additional companies to produce PPE for the U.S. market, it is not clear whether these efforts have increased domestic PPE production. In addition, waiving or modifying regulatory requirements is not without risk and may affect the safety, effectiveness, and quality of PPE. For example, on April 3, 2020, FDA issued an EUA allowing certain non-NIOSH-approved and non-FDA-cleared respirators to be imported from China in order to address reported shortages. However, FDA subsequently amended the EUA to exclude certain previously authorized respirators because they failed to demonstrate adequate filtration performance in testing conducted by NIOSH.¹³² FDA has since reissued the EUA, amending the eligibility criteria for respirators imported from China.

DOD Actions: Joint Acquisition Task Force

The Department of Defense (DOD) has taken a number of actions to assist interagency efforts in increasing domestic production and distribution of PPE.¹³³ These actions include activities carried out by the DOD-led Joint Acquisition Task Force, by the Defense Logistics Agency, and to varying degrees under the Defense Production Act (DPA); assistance with interagency contract

Health Emergency (Revised)," Guidance for Industry and Food and Drug Administration Staff, updated May 2020, at <https://www.fda.gov/media/136449/download>. FDA, "Enforcement Policy for Gowns, Other Apparel, and Gloves During the Coronavirus Disease (COVID-19) Public Health Emergency," Guidance for Industry and Food and Drug Administration Staff, March 2020, at <https://www.fda.gov/media/136540/download>.

¹²⁸ This refers to the public health emergency declared by the HHS Secretary for the COVID-19 pandemic on January 31, 2020, pursuant to Section 319 of the Public Health Service Act (42 U.S.C. §247d), and any renewals of such declaration. See HHS, "Public Health Emergency Declarations," at <https://www.phe.gov/emergency/news/healthactions/phe/Pages/default.aspx>.

¹²⁹ FDA Webinar Series, "FDA's Surgical Masks EUA Umbrella," August 18, 2020, at <https://www.fda.gov/medical-devices/workshops-conferences-medical-devices/webinar-series-cdcnioshs-surgical-n95-respirator-guidance-09012020-09012020>.

¹³⁰ For more information, see CRS Legal Sidebar LSB10443, *The PREP Act and COVID-19: Limiting Liability for Medical Countermeasures*, by Kevin J. Hickey.

¹³¹ FDA, "Enforcement Policy for Gowns, Other Apparel, and Gloves During the Coronavirus Disease (COVID-19) Public Health Emergency," Guidance for Industry and Food and Drug Administration Staff, March 2020, at <https://www.fda.gov/media/136540/download>. EUA Letter to Manufacturers of Gowns and Other Apparel; Healthcare Personnel; Hospital Purchasing Departments and Distributors; and Any Other Stakeholders, May 22, 2020, at <https://www.fda.gov/media/138326/download>.

¹³² FDA, "Certain Filtering Facepiece Respirators from China May Not Provide Adequate Respiratory Protection—Letter to Health Care Providers," June 7, 2020, at <https://www.fda.gov/medical-devices/letters-health-care-providers/certain-filtering-facepiece-respirators-china-may-not-provide-adequate-respiratory-protection-letter>.

¹³³ See for example press briefing provided by Ellen M. Lord, Undersecretary of Defense for Acquisition and Sustainment, August 20, 2020, available at <https://www.defense.gov/Newsroom/Transcripts/Transcript/Article/2319990/ellen-m-lord-undersecretary-of-defense-for-acquisition-and-sustainment-briefs-m/>. See also Terri Moon Cronk, "DOD Establishes Task Force to Meet U.S. Medical Equipment Needs," *DOD News*, March 25, 2020, available at <https://www.defense.gov/Explore/News/Article/Article/2124528/dod-establishes-task-force-to-meet-us-medical-equipment-needs/>.

actions to expand PPE production capacities within the health industrial base¹³⁴ and replenish federally owned stockpiles; and PPE acquisition and distribution through the Defense Logistics Agency (DLA).¹³⁵

JATF-Supported Coordination and Procurement

On March 25, 2020, DOD announced that it had established a new Joint Acquisition Task Force (JATF) to provide a centralized coordinating mechanism to address interagency requests for acquisition support associated with the COVID-19 pandemic response.¹³⁶ The JATF is comprised of members of the DOD acquisition workforce from the Office of the Secretary of Defense and other DOD components. The task force has been employed to support pandemic countermeasures by DOD as well as other agencies. DOD describes the JATF as “leverage[ing] DOD [acquisition] authorities, tools, and skillsets to assist in meeting the Nation’s demand signal [for medical supplies and equipment such as [PPE] as defined by DOD and the interagency.”¹³⁷ DOD has indicated that it may use many of the unique acquisition authorities granted to it by Congress—such as its authority to conduct *other transactions* (OT) and the Commercial Solutions Opening pilot program established by the FY2017 National Defense Authorization Act—as it provides this assistance.¹³⁸

In response to the pandemic, the JATF’s work has focused on providing *assisted acquisitions*—a type of interagency acquisition where an agency performs acquisition activities on a requesting agency’s behalf, such as awarding and administering a contract, task order, or delivery order—to HHS and FEMA.¹³⁹ This assistance is intended to support HHS in expanding the domestic health industrial base, including the manufacturing throughput of health and medical resources, such as PPE (see **Table 5**). Much of the investment and industrial capacity expansion activities facilitated

¹³⁴ The term “health industrial base” is used to describe the domestic industrial capabilities and attendant supply chains that support the production of health and medical-related articles for the United States. It is used as a health-related analogue of the defense industrial base.

¹³⁵ Testimony of Ellen M. Lord, Undersecretary of Defense for Acquisition and Sustainment, U.S. Congress, House Committee on Armed Services, *Department of Defense COVID-19 Response to Defense Industrial Base Challenges*, 116th Cong., 2nd sess., June 10, 2020. See also CRS In Focus IF11574, *National Stockpiles: Background and Issues for Congress*, by G. James Herrera and Frank Gottron.

¹³⁶ Joint Acquisition Task Force (JATF) Fact Sheet, available at <https://www.acq.osd.mil/fo/acq/docs/28AUG2020-COVID-19-Joint-Acquisition-Task-Force-Fact-Sheet.pdf>. A *joint task force* is a military organizational construct that brings together personnel from at least two DOD military departments or components, generally in order to respond to a specific military operation or crisis; such a task force is typically disbanded when it has completed its mission. While the JATF does not appear to be operating as a specifically *military* (i.e., led by a military commander) joint task force, as established by DOD doctrine, statements made by DOD officials indicate that the JATF has broadly adopted and modeled itself after the temporary organizational characteristics of such a task force. See broadly Joint Publication 3-33, “Joint Task Force Headquarters,” January 31, 2018, available at https://www.jcs.mil/Portals/36/Documents/Doctrine/pubs/jp3_33.pdf.

¹³⁷ JATF Fact Sheet, available at <https://www.acq.osd.mil/fo/acq/docs/28AUG2020-COVID-19-Joint-Acquisition-Task-Force-Fact-Sheet.pdf>; see also Office of the Under Secretary of Defense for Acquisition and Sustainment, “COVID-19 Joint Acquisition Task Force,” available at <https://www.acq.osd.mil/jatf.html>.

¹³⁸ See generally CRS Report R45521, *Department of Defense Use of Other Transaction Authority: Background, Analysis, and Issues for Congress*, by Heidi M. Peters and AFWERX, “COVID-19 National Response Team,” available at <https://www.afwerx.af.mil/coronavirus.html>.

¹³⁹ See Federal Acquisition Regulation (FAR) Subsection 2.101, “Definitions;” see also FAR Subpart 17.5, “Interagency Acquisitions.” See also testimony of Ellen M. Lord, Undersecretary of Defense for Acquisition and Sustainment, U.S. Congress, House Committee on Armed Services, *Department of Defense COVID-19 Response to Defense Industrial Base Challenges*, 116th Cong., 2nd sess., June 10, 2020.

by the JATF use appropriations and authorities provided to HHS by the CARES Act (P.L. 116-136.)¹⁴⁰

DOD officials have testified that the JATF's activities have allowed DOD to provide emergency acquisition support to procurement officers at HHS and FEMA in reaction to the urgency and volume of federal acquisitions associated with the COVID-19 pandemic response.¹⁴¹ In testimony before the House Armed Services Committee in June 2020, DOD officials indicated that investments facilitated by the JATF will result in a cumulative annual increase in domestic manufacturing capacity for N-95 respirators "in excess of a billion per year" beginning in 2021.¹⁴² Table 4 shows selected JATF domestic PPE contracts awarded in response to the pandemic.

Table 4. Selected JATF Domestic PPE Industrial Base-Related Contracts Awarded in Coordination with HHS to Respond to the COVID-19 Pandemic

organized by date of action in 2020

Action Date	Primary Agency	Secondary Agency	Action Award	Description
May 6	DOD	HHS	\$126 million	Increase production of 26 million N95 medical-grade respirators per month, starting in October 2020
June 19	DOD	HHS	\$13.5 million	Increase production capacity of meltblown filtration media
July 17	DOD	HHS	\$3.5 million	Increase production of surgical masks
July 23	DOD	HHS	\$22.4 million	Increase production capacity for nitrile butadiene rubber (NBR) gloves
July 25	DOD	HHS	\$2.75 million	Increase production of meltblown fiber

Source: CRS review of DOD press releases and contract announcements.

Notes: In coordination with HHS and FEMA, JATF and other DOD components have undertaken additional actions in response to the COVID-19 pandemic. This table presents selected examples of JATF-facilitated contract actions to expand PPE production capacities within the domestic health industrial base.

¹⁴⁰ In part, the CARES Act provided \$27.0 billion to the HHS Secretary to "prevent, prepare for, and respond to coronavirus, domestically or internationally, including the development of necessary countermeasures and vaccines, prioritizing platform-based technologies with U.S.-based manufacturing capabilities, the purchase of vaccines, therapeutics, diagnostics, necessary medical supplies, as well as medical surge capacity, addressing blood supply chain, workforce modernization, telehealth access and infrastructure, initial advanced manufacturing, novel dispensing, enhancements to the U.S. Commissioned Corps, and other preparedness and response activities," with provisos that in part direct these appropriated funds may be "used to develop and demonstrate innovations and enhancements to manufacturing platforms to support such capabilities"; may be used for "grants for the construction, alteration, or renovation of non-federally owned facilities to improve preparedness and response capability at the State and local level"; and may be used for the "construction, alteration, or renovation of non-federally owned facilities for the production of vaccines, therapeutics, and diagnostics where the Secretary determines that such a contract is necessary to secure sufficient amounts of such supplies." P.L. 116-136, 134 Stat. 560.

¹⁴¹ Both FEMA and HHS traditionally handle relatively smaller annual budgets and associated procurements. Testimony of Ellen M. Lord, Undersecretary of Defense for Acquisition and Sustainment, U.S. Congress, House Committee on Armed Services, *Department of Defense COVID-19 Response to Defense Industrial Base Challenges*, 116th Cong., 2nd sess., June 10, 2020.

¹⁴² Testimony of Stacy Cummings, JATF Director, U.S. Congress, House Committee on Armed Services, *Department of Defense COVID-19 Response to Defense Industrial Base Challenges*, 116th Cong., 2nd sess., June 10, 2020; see also C. Todd Lopez, "Domestic N95 Mask Production Expected to Exceed 1 Billion in 2021," *DOD News*, June 10, 2020, available at <https://www.defense.gov/Explore/News/Article/Article/2215532/domestic-n95-mask-production-expected-to-exceed-1-billion-in-2021/>.

Defense Logistics Agency

DOD's Defense Logistics Agency (DLA) has been active in the federal COVID-19 response, owing in part to its global presence and extensive experience with facilitating large and complex logistics assignments on behalf of the DOD and, at times, the federal government more broadly.

DLA is a *combat support agency* (with distinct requirements under Title 10 U.S.C.) within DOD that is responsible for providing supplies and services common to all military departments.¹⁴³ DLA's primary purpose is to meet the logistics requirements of the armed forces for food, clothing, fuel, parts, and other items including medical material. Its major responsibilities are to "(1) buy or contract, (2) warehouse when needed, and (3) distribute about 5 million distinct consumable, expendable and repairable items" to its customers.¹⁴⁴ The agency typically contracts for high-volume, commercially-available items based on customer requirements. It then distributes these items directly to the requesting customer (e.g., a military unit or defense facility like a shipyard), or stores the items for later delivery.¹⁴⁵ DLA is headquartered in Fort Belvoir, VA, but operates in most U.S. states and territories, and in 28 foreign countries, using a large distribution network consisting of both military and commercial support providers. DLA also works closely with the United States Transportation Command (USTRANSCOM) to ensure purchased or contracted supplies can be transported anywhere in the world.¹⁴⁶ DLA's broad logistical footprint, and demonstrated capability for administering the distribution of supplies worldwide during contingency operations, has contributed to calls from some Members of Congress and elsewhere for an enhanced DLA role in response to the pandemic.¹⁴⁷

DLA Support for the Domestic COVID-19 Response

DLA typically contracts for and distributes nearly all types of medical supplies to military units, DOD agencies, and other federal partners and allies as directed by the Secretary of Defense. In some cases, small stocks of certain types of medical equipment or supplies may be stored by DLA or a military service in a DOD warehouse, and, when needed, can be directly transported to DOD customers. For instance, in the early days of the COVID-19 domestic response, DOD provided approximately 5 million N-95 respirator masks and 2,000 deployable ventilators to HHS.¹⁴⁸ However, DOD generally employs a "just-in-time" logistics strategy for manufactured products, such as PPE, which reduces the amount of government purchased material (GPM) stockpiled in DOD warehouses in favor of commercial-reliant solutions, such as direct vendor delivery, prime vendor contracting, and contingency contracts (also called "readiness contracts").¹⁴⁹ Consequently, medical materials and supplies are typically stored at vendor facilities and shipped directly to customers.¹⁵⁰

¹⁴³ See 10 U.S.C. §191 and 10 U.S.C. §193(f).

¹⁴⁴ Defense Logistics Agency (DLA), *Defense Logistics Agency Fact Sheet*, DOD, May 2020, at <https://www.dla.mil/Portals/104/Documents/Headquarters/DLA%20At%20A%20Glance/DLAFactSheetMay2020.pdf>.

¹⁴⁵ CRS In Focus IF11543, *Defense Primer: The Defense Logistics Agency*, by G. James Herrera and Hibbah Kaileh.

¹⁴⁶ CRS In Focus IF11479, *Defense Primer: United States Transportation Command*, by G. James Herrera and Hibbah Kaileh.

¹⁴⁷ See, for example, H.R. 8562.

¹⁴⁸ Ellen Mitchell, "Pentagon to Give 5M Respirator Masks, 2,000 Ventilators to HHS in Response to Coronavirus Outbreak," *The Hill*, March 17, 2020, at <https://thehill.com/policy/defense/488085-pentagon-to-give-5m-Ven-2000-ventilators-to-hhs>.

¹⁴⁹ CRS In Focus IF11574, *National Stockpiles: Background and Issues for Congress*, by G. James Herrera and Frank Gotttron.

¹⁵⁰ From correspondence with DLA.

Following the surge in demand for certain types of medical equipment and PPE, across the country, DLA also saw a surge in demand for these same items from its customers (both within DOD and from non-DOD federal agencies). As an example of an early response measure, DLA initiated weekly conference calls at the start of the pandemic with major commercial suppliers to share information and discuss financial and logistics issues created by the pandemic.¹⁵¹ DLA then established additional contracts with manufacturers to produce larger quantities of high-demand medical materials that could supplement the whole of government COVID-19 response.

Table 5 provides DLA-reported figures (from August 2020) of certain medical materials *contracted for*, and *shipped/delivered* to both DOD and non-DOD federal customers (the latter directed by HHS/FEMA, who are the lead agencies of the COVID-19 Supply Chain Task Force).¹⁵²

Table 5. Selected Medical Materials Contracted for and Shipped/Delivered by DLA
for August 26, 2020 (in millions)

	N95 Respirator Masks	Non-Medical and Surgical Masks	Exam Gloves	Hand Sanitizers	Testing Components	Ventilators	Isolation and Surgical Gowns
Provided to DOD/Military							
Contracted	5.635	67.873	167.764	1.271	0.241	0.003	3.092
Shipped/ Delivered	4.279	58.331	144.468	1.087	0.103	0.002	1.650
Provided to Non-DOD Federal Agencies							
Contracted	0.060	2.883	5.692	0.027	6.394	0.004	0.056
Shipped/ Delivered	0.026	2.655	5.176	0.023	0.001	0.004	0.025

Source: Tabulated by CRS from data provided by DLA.

Note: DLA combines “shipped” and “delivered” in its accounting because Class VIII supply is normally shipped directly to customers from vendors and guaranteed delivery is part of the DOD contract. Contracted amounts are not a cumulative total of all medical materials contracted for since the start of the COVID-19 pandemic.

The figures provided in this table are for a specific date (August 26, 2020) and are not cumulative from the start of the pandemic. There can be differences in published totals attributed to fluctuations in orders. Orders fluctuate daily from new contracts, order cancellations, and quantity adjustments.¹⁵³

As of August 31, 2020, DLA had executed over 18,000 contract actions, obligating over \$1.5 billion to provide medical supplies—including test kits, ventilators, pharmaceutical drugs, and both medical and non-medical PPE—to meet customer demands and support the SNS.

According to DLA:

DLA’s existing relationships and standing agreements with FEMA and HHS were vital to the success of initial operations, enabling a rapid transition to full integration with FEMA,

¹⁵¹ Ibid.

¹⁵² Lindsay Maizland, “U.S. Coronavirus Response: Who’s In Charge of What?” Council on Foreign Relations, April 7, 2020, at <https://www.cfr.org/article/us-trump-coronavirus-response-covid19-agencies-in-charge>.

¹⁵³ CRS cannot independently verify the data provided by DLA, nor necessarily match the relationship of that data to end users or health providers in response to the COVID-19 pandemic.

HHS and the White House Supply Chain Task Force. DLA provided 20 DLA personnel beginning March 22, 2020 to FEMA, HHS, the [White House Supply Chain] Task Force, the Joint Acquisition Task Force, and Operation Warp Speed [¹⁵⁴]. Additionally, 18 DLA personnel supported U.S. Northern Command and DOD operations from April 5, 2020 to May 31, 2020.¹⁵⁵

DLA Medical Material Support

DLA has provided PPE and other essential medical materials to both DOD and its federal government partners. Not all of these medical materials were delivered through commercial producers from direct procurements (i.e., contracting for commercial products). The following selected examples of DLA support during the COVID-19 pandemic in **Table 6** show a range of different approaches taken to provide needed medical materials to DLA customers.

Table 6. Selected Examples of DLA Medical Material Support
selected for illustrative purposes

Example Area	Description
Support to U.S. Navy Hospitals Ships	<p>From March to May 2020, DLA provided over \$13 million in support to the USNS Comfort and USNS Mercy in preparation for their deployments to the East and West Coasts of the United States. This support included \$2 million in food products, \$2.8 million in fuel, and \$8.5 million in medical supplies.</p> <p>DLA states they “ensured these critical floating hospitals were stocked with essential pharmaceuticals, PPE, subsistence items, and [N-95] respirators redistributed from excess property” (emphasis added by CRS).¹⁵⁶</p>
Reutilization of Excess Personal Property	<p>Beginning in March 2020, U.S. states were requesting excess military medical supplies and equipment from DOD.¹⁵⁷ States made requests for several items, including vital signs monitors, anesthesia machines, gloves, gowns, and surgical drapes.</p> <p>In its role as the Department-wide agency responsible for excess personal property reutilization, transfer, and donation (R/T/D) for property received from the Military Services, DLA reutilized \$23.6 million (approximately 4,500 requisitions) worth of excess personal property to support the U.S. COVID-19 response.¹⁵⁸ DLA, through its Disposition Services major subordinate command—which manages DOD’s personal property disposal process—delivered the repurposed medical items to DOD and its federal partners.¹⁵⁹</p>
Rapid Prototyping to Support Manufacturing	<p>In April 2020, DLA procured more than 11,000 face shields for first responders in New York City using a rapid prototype project, and executed this contract award and delivery in less than two weeks.¹⁶⁰</p>

¹⁵⁴ DLA reports that as of August 31, 2020, the agency is providing eight of its personnel to FEMA, HHS, and the two task forces, including supporting Operation Warp Speed.

¹⁵⁵ From correspondence with DLA.

¹⁵⁶ From correspondence with DLA.

¹⁵⁷ For more information on excess personal property, see U.S. General Services Administration (GSA), “Personal Property for Reuse and Sale,” accessed August 31, 2020, at <https://www.gsa.gov/buying-selling/government-property-for-sale-or-disposal/personal-property-for-reuse-and-sale>.

¹⁵⁸ See DLA Disposition Services, “Reutilization, Transfer and Donation (R/T/D),” at <https://www.dla.mil/DispositionServices/Offers/Reutilization.aspx>.

¹⁵⁹ See DLA Disposition Services, “Mission,” at <https://www.dla.mil/DispositionServices/About/Mission/>.

¹⁶⁰ From correspondence with DLA.

Example Area	Description
Decontamination as a Means of Recycling PPE	In April 2020, DLA awarded a contract to Battelle Memorial Institute for 60 Critical Care Decontamination Systems (CCDS) and six months of service at \$413 million, in support of HHS. ¹⁶¹ Each unit is capable of sterilizing up to 80,000 N-95 respirators per day and extend the life of a single mask by 20 uses. ¹⁶²
Targeted Procurement Contracting	Beginning in May 2020, DLA and HHS worked together to identify those domestic nursing home facilities with the highest risk of contracting COVID-19. DLA then ordered \$134 million in PPE for these nursing homes. Over 30,000 deliveries consisting of masks, eye protection, gloves, gowns, and face shields were completed on August 11, 2020. Additionally, HHS requested that DLA assist with the distribution of approximately 1.5 million N-95 respirators to over 3,000 U.S. nursing homes. ¹⁶³

Source: Tabulated from DLA information and correspondence.

Notes: These examples are illustrative and do not represent an exhaustive accounting of DLA actions or activities in support of COVID-19 PPE and medical material countermeasures.

How DLA Utilized Existing U.S. Government Platforms to Provide PPE

In addition to those medical materials that were contracted and delivered by DLA (i.e., shipped by its vendors directly to federal agencies), or repurposed through DOD's personal property disposal process, DLA also launched a facilitation program called the "FedMall Small Business E-Commerce Corridor" on June 15, 2020. The program provides a secure website that grants access to a restricted "storefront," which allows small business contractors to purchase PPE for their employees to safely perform contracts for the government. The program makes use of the U.S. government's existing e-commerce online purchasing platform known as "FedMall."

In mid-July 2020, DLA initiated a similar program known as the "State and Local Government FedMall Purchasing Program" to support state and local government purchasing of *non-medical PPE* (e.g., non-medical face masks, disinfecting wipes, hand sanitizer). This program employs the same FedMall online purchasing platform. However, under this program, state and local governments can purchase non-medical PPE at or below the micro-purchase contract threshold of \$10,000 for use while performing first responder missions in support of counter drug, homeland security, or emergency response.

DLA states, the "benefit of FedMall's online shopping tool is it provides dynamic pricing and a safe shopping experience with pre-qualified suppliers."

Defense Production Act

The Defense Production Act (DPA) has been employed by the Trump Administration in response to the COVID-19 pandemic, with the apparent rate and volume of actions increasing over time (as tabulated on **Table 7**, **Table 8**, **Table 9**, and **Table 10**). However, the Administration's implementation pattern has been relatively narrow in application, and appears to have prioritized defense industrial base investments over PPE or health industrial base actions.¹⁶⁴

¹⁶¹ By June 2020, all 60 CCDS were delivered. From correspondence with DLA.

¹⁶² From correspondence with DLA.

¹⁶³ Ibid.

¹⁶⁴ For more information on the defense industrial base, see CRS In Focus IF10548, *Defense Primer: U.S. Defense Industrial Base*, by Heidi M. Peters.

Background on the DPA

The DPA confers broad presidential authorities to mobilize domestic industry in service of the *national defense*, defined in statute as various military activities and “homeland security, stockpiling, space, and any directly related activity,”¹⁶⁵ including emergency preparedness activities under the Stafford Act. Many of these authorities were delegated to executive agencies under Executive Order 13603, issued by President Barack Obama in 2012.¹⁶⁶

DPA authorities relevant to the COVID-19 response include,¹⁶⁷ but are not limited to:

- **Title I: Priorities and Allocations**, which allows the President to require persons (including businesses and corporations) to (1) prioritize and accept government contracts for materials and services; and (2) allocate or control the general distribution of materials, services, and facilities as necessary to promote the national defense. Title I also includes provisions to prevent price gouging and the hoarding of scarce materials.
- **Title III: Expansion of Productive Capacity and Supply**, which allows the President to provide economic incentives to secure domestic industrial capabilities essential to meet national defense requirements. DPA Title III is specifically intended to “create, maintain, protect, expand, or restore domestic industrial base capabilities.”¹⁶⁸ Authorized incentives include loans, loan guarantees, direct purchases and purchase commitments, and the authority to procure and install equipment in private industrial facilities.
- **Title VII: General Provisions**, which include key definitions and other distinct authorities. These provisions grant the President the authority to establish voluntary agreements with private industry; collect proprietary information; block proposed or pending foreign corporate mergers, acquisitions, or takeovers that threaten national security;¹⁶⁹ employ persons of outstanding experience and ability; and establish a volunteer pool of industry executives who could be called to government service.

DPA and COVID-19 Response

Since the COVID-19 pandemic emerged, the Trump Administration’s implementation of DPA has appeared to be relatively narrow in scope.¹⁷⁰ Although the observed volume of DPA actions has increased over time (as tabulated on **Table 7**, **Table 8**, **Table 9**, and **Table 10**), publicized individual DPA Title I prioritization actions have been relatively few. With the exception of one

¹⁶⁵ 50 U.S.C. §4552.

¹⁶⁶ Executive Order 13603, “National Defense Resources Preparedness,” 77 *Federal Register* 16651-16660, March 22, 2012, at <https://www.federalregister.gov/documents/2012/03/22/2012-7019/national-defense-resources-preparedness>.

¹⁶⁷ For an in-depth discussion of the DPA’s history and authorities, see CRS Report R43767, *The Defense Production Act of 1950: History, Authorities, and Considerations for Congress*, by Michael H. Cecire and Heidi M. Peters.

¹⁶⁸ 50 U.S.C. §4533.

¹⁶⁹ 50 U.S.C. §4565(k). This provision authorizes the Committee on Foreign Investment in the United States (CFIUS). For more information, see CRS Report RL33388, *The Committee on Foreign Investment in the United States (CFIUS)*, by James K. Jackson.

¹⁷⁰ For further CRS accounting of DPA implementation in response to COVID-19, see CRS Insight IN11470, *Defense Production Act (DPA): Recent Developments in Response to COVID-19*, by Michael H. Cecire and Heidi M. Peters; CRS Insight IN11387, *COVID-19: Defense Production Act (DPA) Developments and Issues for Congress*, by Michael H. Cecire and Heidi M. Peters; and CRS Insight IN11337, *The Defense Production Act (DPA) and the COVID-19 Pandemic: Recent Developments and Policy Considerations*, by Michael H. Cecire and Heidi M. Peters.

priority-rated order on July 8, 2020, no new DPA Title I prioritization orders for health articles have occurred since April 21 (see **Table 8**). In addition, a majority of DPA Title III funding has been awarded to support the non-medical defense industrial base (**Table 10**) rather than to support and/or expand the health industrial base in response to COVID-19.¹⁷¹

In response to the COVID-19 pandemic, the Administration has issued 10 presidential directives related to the DPA (**Table 7**). Six of these actions are executive orders, and four are presidential memoranda.

The Administration has employed the DPA selectively, focusing on individual companies (e.g., General Motors, 3M) or industry sub-sectors (e.g., meat processing). Sporadic DPA efforts have been employed in response to complaints from Congress and some governors regarding ongoing shortages of PPE,¹⁷² testing supplies,¹⁷³ and other such resources.

The Administration's announced actions have primarily framed the DPA as a coercive instrument (e.g., the President called the DPA a "tremendous hammer"¹⁷⁴) with relatively narrow application. In an interview with the media, White House trade advisor Peter Navarro reiterated prior assertions that the Administration wielded DPA authorities to influence voluntary action without the need to actually implement them.¹⁷⁵

Table 7. DPA Presidential Directives

by date of directive

Date	Type	Title
March 18, 2020	Executive Order (13909)	Prioritizing and Allocating Health and Medical Resources to Respond to the Spread of COVID-19
March 23, 2020	Executive Order (13910)	Preventing Hoarding of Health and Medical Resources to Respond to the Spread of COVID-19
March 27, 2020	Executive Order (13911)	Delegating Additional Authority Under the Defense Production Act With Respect to Health and Medical Resources to Respond to the Spread of COVID-19
March 27, 2020	Memorandum	Memorandum on Order Under the Defense Production Act Regarding General Motors Company
April 2, 2020	Memorandum	Memorandum on Order Under the Defense Production Act Regarding the Purchase of Ventilators
April 2, 2020	Memorandum	Memorandum on Order Under the Defense Production Act Regarding 3M Company

¹⁷¹ See CRS Insight IN11288, COVID-19 and the Defense Industrial Base: DOD Response and Legislative Considerations, by Heidi M. Peters.

¹⁷² Centers for Disease Control and Prevention, "Operational Considerations for Personal Protective Equipment in the Context of Global Supply Shortages for Coronavirus Disease 2019 (COVID-19) Pandemic: Non-US Healthcare Settings," May 5, 2020, at <https://www.cdc.gov/coronavirus/2019-ncov/hcp/non-us-settings/emergency-considerations-ppe.html>.

¹⁷³ Burgess Everett and Marianne Levine, "Capitol Physician Says Senate Lacks Capacity to Test All Senators," *Politico*, April 30, 2020, at <https://www.politico.com/news/2020/04/30/capitol-physician-senators-coronavirus-testing-226980>.

¹⁷⁴ Alice Miranda Ollstein, "Trump Invokes DPA for Testing Swabs, Weeks After Reported Shortages," *Politico*, April 19, 2020, at <https://www.politico.com/news/2020/04/19/trump-dpa-testing-swabs-reported-shortages-195721>.

¹⁷⁵ Priscilla Alvarez, Curt Devine, Drew Griffin, and Kristen Holmes, "Trump Administration's Delayed Use of 1950s Law Leads to Critical Supplies Shortages," *CNN.com*, July 14, 2020, at <https://www.cnn.com/2020/07/13/politics/delayed-use-defense-production-act-ppe-shortages/index.html>.

Date	Type	Title
April 3, 2020	Memorandum	Memorandum on Allocating Certain Scarce or Threatened Health and Medical Resources to Domestic Use
April 28, 2020	Executive Order (13917)	Delegating Authority Under the Defense Production Act with Respect to Food Supply Chain Resources During the National Emergency Caused by the Outbreak of COVID-19
May 14, 2020	Executive Order (13922)	Delegating Authority Under the Defense Production Act to the Chief Executive Officer of the United States International Development Finance Corporation to Respond to the COVID-19 Outbreak
August 6, 2020	Executive Order (13944)	Combating Public Health Emergencies and Strengthening National Security by Ensuring Essential Medicines, Medical Countermeasures, and Critical Inputs Are Made in the United States

Source: Tabulated by CRS from the *Federal Register* and White House website.

Notes: Only the executive orders were entered into the *Federal Register*. Although presidential memoranda may be entered into the *Federal Register* at the President's discretion, that option did not appear to be exercised in these cases.

The Administration has not consistently employed DPA authorities to expedite PPE contracts, and certain Members of Congress have raised concerns over PPE availability and urged use of DPA authorities to address those concerns.¹⁷⁶ On July 19, 2020, DOD and HHS announced a \$3.5 million award for surgical mask production (with full delivery not expected until May 2021);¹⁷⁷ however, this did not appear to be accomplished under DPA authorities.

Although the DPA statute does not require the President to use directives to invoke DPA authorities, the President may issue executive orders, memoranda, or other directives as a means of framing the intent and implementation of those DPA authorities. This appears to have been the Trump Administration's practice in response to the pandemic, but this has not always been a standard practice. For example, during "peacetime," DOD (the highest volume user of DPA authorities) typically utilizes DPA Title I authorities without accompanying, specific presidential directives.¹⁷⁸ Additionally, the DPA statute does not provide for any requirement that DPA actions be made public. Although individual DPA actions may be made public through executive agency press releases, in FPDS reporting,¹⁷⁹ or in some other capacity, there is no standing requirement for publishing DPA actions, and no centralized repository where they are collected.

¹⁷⁶ U.S. Congress, House, Letter to President Trump, prepared by Rep. Pramila Jayapal and Rep. Jaime Herrera Beutler, 116th Cong., June 23, 2020, at https://jayapal.house.gov/wp-content/uploads/2020/06/6.23.20_Jayapal-Herrera-Beutler-DPA-PPE-.pdf.

¹⁷⁷ Department of Defense, *DOD Awards \$3.5 Million Contract to Crosstex International, Inc. to Increase Domestic Production of Surgical Masks*, July 19, 2020, at <https://www.defense.gov/Newsroom/Releases/Release/Article/2279253/dod-awards-35-million-contract-to-crosstex-international-inc-to-increase-domest/>.

¹⁷⁸ For example, the Department of Defense (DOD) makes frequent use of the DPA, and in particular uses Title I authorities on a routine basis. According to the Defense Production Act Committee (DPAC) report for CY2016, it notes that "virtually all DOD contracts for resources covered under DPAS (including Foreign Military Sales contracts) include a [Defense Priorities and Allocations System] priority rating [i.e., are DPA Title I actions]." U.S. Department of Homeland Security, *The Defense Production Act Committee Report to Congress, for Calendar Year 2016*, September 18, 2017, p. 5.

¹⁷⁹ FPDS does not have a dedicated designator for DPA actions. However, it does contain a free text field within which an agency may record a contract as a DPA action, which can provide evidence for otherwise unpublicized DPA activity. Because this practice is not always observed, it is not necessarily a reliable means of exhaustively capturing or measuring DPA activity.

In August 2020, the White House Office of Trade and Manufacturing Policy released a report describing and defending the Administration's employment of DPA authorities.¹⁸⁰ The report includes significant details on DPA actions taken during the pandemic. However, given that DPA activities are not fully transparent and not all of the information can be independently verified, it remains unclear if the report is exhaustive. For example, with regard to the use of the allocations authorities, the report does not provide details of all occurrences.¹⁸¹

Title I Prioritization Activities

According to the White House report, the Administration has employed DPA Title I authorities 19 times in response to the COVID-19 pandemic, though only three instances related to PPE among the 19 cited by the Administration.

DPA Title I activities are shown in **Table 8**.

Table 8. DPA Title I Actions: Reported by the Administration

by announcement date

Date	Agency	Funding	Vendor	Description
March 28, 2020	FEMA	—	Puritan Medical	Upstream machine shop services.
March 28, 2020	FEMA	—	N/A	Blanket request required to invoke DPA.
March 30, 2020	HHS	\$552 million	Hamilton	Contract action for 25,574 ventilators.
March 30, 2020	HHS	\$350 million	Zoll	Contract action for 18,900 ventilators.
April 5, 2020	FEMA	—	N/A	Memo expediting N95 respirators to New Jersey.
April 8, 2020	HHS	\$489 million	GM	Contract action for 30,000 ventilators.
April 8, 2020	HHS	\$647 million	Philips	Contract action for 43,000 ventilators.
April 10, 2020	FEMA	—	Zoll	Applied rating to Zoll ventilator contract.
April 10, 2020	FEMA	—	N/A	Memo compelling sale of filtering face pieces and respirators in shipment. ^a
April 13, 2020	FEMA	—	N/A	Authorized construction of alternate care facilities.
April 13, 2020	HHS	\$64 million	General Electric	Contract action for 2,410 ventilators.
April 13, 2020	HHS	\$20 million	Hill-Rom	Contract action for 3,400 ventilators.
April 13, 2020	HHS	\$9 million	Medtronic	Contract action for 1,056 ventilators.
April 13, 2020	HHS	\$32 million	ResMed	Contract action for 2,550 ventilators.
April 13, 2020	HHS	\$408 million	Vyaire	Contract action for 22,000 ventilators.
April 13, 2020	HHS	—	Combat Medical ^b	Contract action for 12,000 ventilators.

¹⁸⁰ The White House Office of Trade and Manufacturing Policy, *How President Trump Uses the Defense Production Act to Protect America from the China Virus*, July 2020, at <https://www.whitehouse.gov/wp-content/uploads/2020/08/OTMP-DPA-Report-FINAL-8.13.20.pdf>.

¹⁸¹ Ibid.

Date	Agency	Funding	Vendor	Description
April 16, 2020	FEMA	—	N/A	Priority ratings for PPE/Equipment for DoD Medical Treatment Facilities
April 21, 2020	HHS	—	Biomedical Devices ^b	Contract action for 12,000 Powered Air Purifying Respirators.
July 8, 2020	HHS	\$70 million	Becton Dickinson	50M needles and syringes to support vaccination.
August 20, 2020	HHS	—	Becton Dickinson, Quidel	Large volume purchase of diagnostic systems and assays for COVID-19 testing for nursing homes

Source: White House report on the DPA. Where possible, information listed is cross reference against information tabulated from Administration press releases and FPDS. The August 20, 2020 entry was not included in the report, and was tabulated separately: <https://www.hhs.gov/about/news/2020/08/20/trump-administration-uses-defense-production-act-to-aid-our-most-vulnerable.html>.

Notes:

- a. A FEMA DPA Title I priority-rated order with the 3M Company was announced on April 16, but was not tabulated as such in the White House report, though it is cited in the narrative; the April 10 table entry may refer to the 3M contract actions. The 3M contract actions were entered separately into FPDS by shipment. As of August 5, 2020, five such shipments have been identified in FPDS.
- b. Funding amounts were not included in the report, and are tabulated here from publicly available executive agency press releases as available. In at least two cases—contract actions with companies Combat Medical and Biomedical Devices—those funding amounts were not publicly released. However, according to FPDS, major contract actions were made with these companies for \$62 million and \$110 million, respectively. These contract actions appear to comport with the Title I actions in this table, but cannot be independently verified and thus are not listed in the table.

The table above reflects data provided in the White House report, which disaggregates each Title I event by company where available, and does not include funding amounts. Additionally, the White House report also includes selected non-contract Title I actions, such as the assignment of priority ratings (which normally would occur as part of a contract action), in the table as discrete events.

Title I Allocations and Anti-Hoarding/Price Gouging Actions

The Title I actions listed above do not appear to be reflective of all Title I activities, as they do not account for some allocation actions that are known to have occurred, particularly allocations of scarce medical supplies and anti-hoarding/price gouging actions (**Table 9**). Unlike actions taken under the Title I prioritization authority, allocation actions do not yield DPA-rated contract orders, and are less frequently publicized, making them more difficult to track. Given the breadth of the Title I allocations authority and lack of a publication requirement, the usage rate or volume of allocations is not publicly known.

On April 10, 2020, FEMA, in coordination with Customs and Border Protection (CBP), released guidance on the use of DPA to allocate specific scarce medical supplies, per Executive Order (E.O.) 13090 and the President’s April 3 memorandum.¹⁸² This allocations action was justified in the final rule as a measure to preserve domestic stocks of scarce medical supplies, including PPE, because the “domestic need for them exceeds the supply.” The rule allocated these supplies

¹⁸² FEMA, “Prioritization and Allocation of Certain Scarce or Threatened Health and Medical Resources for Domestic Use,” 85 *Federal Register* 20195, April 10, 2020, at <https://www.federalregister.gov/documents/2020/04/10/2020-07659/prioritization-and-allocation-of-certain-scarce-or-threatened-health-and-medical-resources-for>.

exclusively for domestic use, effectively prohibiting export without FEMA's authorization.¹⁸³ Although the Administration described these measures as necessary to "restrict the export of such threatened PPE," it has not released data on the policy's potential efficacy on domestic PPE supply.

Similarly, under E.O. 13090, the Administration utilized another Title I authority to police price gouging and the hoarding of scarce materials or resources, including PPE, to facilitate domestic supply. The Department of Justice (DOJ), in coordination with FEMA and other Department of Homeland Security (DHS) component agencies, established and leads a COVID-19 Hoarding and Price Gouging Task Force,¹⁸⁴ which has engaged in various enforcement and redistribution actions since its formation in March 2020. **Table 9** includes a selection of those actions.

Table 9. DPA Anti-Hoarding and -Price Gouging Actions
by date of action

Date	Location	Description
March 30, 2020	New Jersey	Alleged hoarding and price gouging of PPE and other medical supplies.
April 2, 2020	New Jersey, New York	Medical supplies seized under the March 30 action were redistributed.
April 24, 2020	New York	Alleged hoarding and price gouging of PPE.
April 28, 2020	New York	Alleged conspiracy to price gouge.
May 26, 2020	New York	Alleged hoarding and price gouging of PPE.
May 26, 2020	New Jersey	Alleged conspiracy to price gouge.
July 8, 2020	New York	Alleged price gouging of PPE.
August 6, 2020	Georgia	Alleged hoarding and price gouging of PPE.
October 8, 2020	Illinois	Alleged price gouging of PPE.
October 13, 2020	California	Alleged hoarding and price gouging of PPE.
October 21, 2020	South Carolina	Alleged conspiracy to steal PPE.
November 24, 2020	Texas	Alleged conspiracy to price gouge.

Source: Tabulated by CRS from DOJ press releases.

Notes: These actions were identified on the DOJ website, but do not represent an exhaustive accounting of all DOJ anti-hoarding and -price gouging actions. Current as of December 3, 2020.

The actions presented above were drawn from DOJ public announcements and are not exhaustive of all such actions undertaken by the DOJ or other agencies with respect to DPA anti-hoarding and -price gouging provisions.¹⁸⁵ According to an October 20, 2020, press release, the DOJ has filed criminal charges in 33 COVID-19-related fraud cases "involving scam vaccines, treatments,

¹⁸³ See Ana Swanson, Zolan Kanno-Youngs, and Maggie Haberman, "Trump Seeks to Block 3M Mask Exports and Grab Masks from Its Overseas Customers," *New York Times*, April 3, 2020, at <https://www.nytimes.com/2020/04/03/us/politics/coronavirus-trump-3m-masks.html>.

¹⁸⁴ Department of Justice (DOJ), *Combating Price Gouging and Hoarding*, accessed September 10, 2020, at <https://www.justice.gov/coronavirus/combatingpricegouginghoarding/>.

¹⁸⁵ See Geneva Sands and Priscilla Alvarez, "Feds Target Price Gouging as States and Hospitals Swarm Private Market for Supplies," *CNN.com*, April 25, 2020, at <https://www.cnn.com/2020/04/25/politics/fema-doj-price-gouging-supplies/index.html>.

or testing or price gouging in the sale of scarce medical supplies,” and has initiated civil actions in an additional 11 cases involving “fraudulent coronavirus schemes targeting consumers.”¹⁸⁶

Although individual enforcement actions were publicized by the Administration, it has not released more comprehensive data on the scale of anti-hoarding/price gouging enforcement or their overall effect on the domestic PPE supply. As such, it is not clear to what degree these provisions have increased domestic availability. It is also possible that these policies could have unintentionally contributed to the diversion or delay of legitimate shipments.¹⁸⁷

Title III Activities

CRS was able to identify six DPA Title III funding announcements through DOD’s DPA Title III office.¹⁸⁸ **Table 10** lists DPA Title III funding actions made in response to COVID-19 by the Trump Administration through August 12, 2020.¹⁸⁹

Table 10. DPA Title III Actions in Response to the Pandemic
as reported by the Trump Administration

Action Date	Action Description	Contract Amount (\$ millions)	Vendor
Title III Actions in Support of the Health Industrial Base			
4/15/2020	12.5M per month capacity increase of N-95 respirators beginning in September	29.3	Owen & Minors Halyard
4/15/2020	12M per month capacity increase of N95 respirators beginning October	27.3	Honeywell
4/17/2020	13M per month capacity increase of N95 respirators beginning June	76	3M
4/27/2020	20M increase in foam swab capacity	75.5	Puritan
5/1/2020	3.1M per month capacity increase of N95 respirators beginning October	1.9	Hollingsworth and Vose
8/10/2020	110K test kits per month	3.1	BioFire Defense
Title III Actions in Support of the Defense Industrial Base			
5/19/2020	Space Solar Cell	6	<i>Not Reported</i>
5/19/2020	Space Solar Cell Substrates	9.3	<i>Not Reported</i>
5/28/2020	Shipbuilding Welding	0.5	<i>Not Reported</i>
5/28/2020	Body Armor Production	15	<i>Not Reported</i>
6/2/2020	Steel Manufacturing for Shipbuilding	19.5	<i>Not Reported</i>
6/5/2020	Aerospace Supplier Sustainment	80	<i>Not Reported</i>

¹⁸⁶ DOJ, Department of Justice is Combatting COVID-19 Fraud but Reminds the Public to Remain Vigilant, October 20, 2020, at <https://www.justice.gov/usao-wdla/pr/departement-justice-combatting-covid-19-fraud-reminds-public-remain-vigilant>.

¹⁸⁷ Eleanor Tyler, “Analysis: Feds Seize PPE Using Unlitigated Hoarding Statute,” *Bloomberg Law*, April 22, 2020, at <https://news.bloomberglaw.com/bloomberg-law-analysis/analysis-feds-seize-ppe-using-unlitigated-hoarding-statute>.

¹⁸⁸ As of October 9, 2020.

¹⁸⁹ Although every effort was made to provide a complete accounting, these may not be exhaustive of all recent DPA activities, as there is no standing requirement for publishing DPA actions, and no centralized repository where they are collected.

Action Date	Action Description	Contract Amount (\$ millions)	Vendor
6/6/2020	Aircraft Propulsion Industry Sustainment	20	Not Reported
6/16/2020	Die Forging Support for Aircraft	25	Not Reported
6/16/2020	Aircraft Fuel System Sustainment	14.9	Not Reported
6/16/2020	Soldier Uniform Fabrics and Textiles	2	Not Reported
6/16/2020	Shipbuilding Supply Chain Development	55	Not Reported
6/17/2020	Aircraft Propulsion Industry Sustainment	55	Not Reported
6/18/2020	Shipyard Improvement Program	50	Not Reported
6/19/2020	Domestic small Unmanned Aircraft System (sUAS) Traffic Management Tool Sustainment	3.3	Not Reported
6/22/2020	Space Industry Radar Sensing Ground Station Sustainment	15	Not Reported
7/1/2020	Domestic Small Unmanned Aerial System (sUAS) Component Production	1.5	Not Reported
7/1/2020	Domestic sUAS IR Sensor Production	1.6	Not Reported
7/1/2020	Domestic sUAS Component Production	4	Not Reported
7/1/2020	Domestic sUAS Flight Controller Production	3	Not Reported
7/6/2020	Navy Alloy Plate Capacity for Shipbuilding	56	Not Reported
7/8/2020	Aircraft Fuel Bladder Sustainment	14.9	Not Reported
7/10/2020	Large Fixed Pitch Propellers for Naval Ships	22	Not Reported
7/21/2020	Domestic Rare Earth Permanent Magnet Production	28.8	Not Reported
7/21/2020	Electronic Microdisplays OLED Production	33.6	Not Reported
7/24/2020	Shipbuilding Supply Chain Development	31	Not Reported
7/28/2020	Aircraft Propulsion Industry Sustainment	62.9	Not Reported
7/31/2020	Mobile Communications Receiver Sustainment	3.6	Not Reported
7/31/2020	Aircraft Propulsion Industry Sustainment	0.5	Not Reported
8/12/2020	Microelectronics Supply Chain Sustainment	7	Not Reported

Source: White House report on the DPA. Where possible, information listed is cross-referenced against information tabulated from Trump Administration press releases and FPDS. Some entries could not be verified by CRS, and were cited in the White House report as described in internal DOD documentation, and thus presumably not available in the open source domain.

The above table does not include a \$765 million loan announced on July 28, 2020, co-facilitated by the International Development Finance Corporation (DFC) and DOD, to Eastman Kodak. That action was subsequently put on hold pending federal investigations into insider trading and other circumstances surrounding the loan. Including the DFC loan, the Trump Administration is supporting approximately \$978 million in health related DPA Title III funding actions as of November 16, 2020. Although the DFC loan has not yet been formally canceled, its implementation may depend on the outcome of those investigations.

Discounting the DFC loan, approximately \$213 million has been directed using Title III authorities to support the health industrial base.

According to the White House's August report on the use of the DPA, as tabulated above, approximately \$641 million was awarded to support elements of the defense industrial base mostly unrelated to PPE, medical equipment, or pharmaceuticals. After August 2020, DOD does not appear to have used DPA Title III authorities in support of the health industrial base, and has continued to prioritize funding for the defense industrial base.¹⁹⁰ Instead, DOD's approach has shifted to utilizing its procurement corps to support HHS-funded actions using non-DPA funding from the CARES Act (see "DOD Actions: Joint Acquisition Task Force").¹⁹¹ However, DOD and HHS cooperation on production expansion can closely resemble DPA Title III actions, and have similar aims.¹⁹²

Voluntary Agreement Under Title VII

The Trump Administration has also engaged in other activities with potential relevance to domestic PPE production and distribution. On May 12, 2020, FEMA and the DOJ announced that they had drafted a "voluntary agreement" pursuant to Title VII of the DPA to coordinate industry cooperation.¹⁹³

According to the draft voluntary agreement, selected participating companies (as determined by the Administration) would join a federally-led "Committee for the Distribution of Healthcare Resources Necessary to Respond to a Pandemic," chaired by the FEMA Administrator. Committee members would cooperate in the industrial development of critical health resources, including PPE as well as pharmaceuticals, respiratory devices, vaccines, raw materials, supplies, and medical devices.¹⁹⁴ Pursuant to the DPA Title VII provisions, the voluntary agreement would allow private companies to cooperate collectively and with the government, in promotion of the national defense, immune from federal antitrust action. The comment period for the draft voluntary agreement expired on June 5, 2020. The agreement expires after five years, and is meant to also provide additional capacity to prepare for future public health contingencies.

¹⁹⁰ See, for example, DOD, "DOD announces \$2.9 Million in Defense Production Act Title III COVID-19 Actions," press release, September 10, 2020, at <https://www.defense.gov/Newsroom/Releases/Release/Article/2344437/dod-announces-29-million-in-defense-production-act-title-iii-covid-19-actions/>.

¹⁹¹ See, for example, DOD, "DOD Awards \$6.98 Million Firm-Fixed Price Contract Action to Teel Plastics, LLC to Increase Domestic Production Capacity of Swabsticks for COVID-19 Testing Swabs," press release, October 16, 2020, at <https://www.defense.gov/Newsroom/Releases/Release/Article/2385096/dod-awards-698-million-firm-fixed-price-contract-action-to-teel-plastics-llc-to/>; and DOD, "DOD Awards \$6.18 Million Contract to Medline Industries, Inc. to Increase Domestic Production Capacity of Surgical Masks," press release, November 16, 2020, at <https://www.defense.gov/Newsroom/Releases/Release/Article/2415847/dod-awards-618-million-contract-to-medline-industries-inc-to-increase-domestic/>.

¹⁹² A November 2020 GAO report on the federal government's use of DPA authorities in response to the COVID-19 pandemic includes, among other findings and analysis, an accounting of DPA Title III and "similar actions." The GAO report's inclusion of "similar actions" refer to collaborative DOD-HHS actions made under the JATF using, HHS-designated CARES Act appropriations (as opposed to DPA Title III actions drawing from the DPA Fund). U.S. Government Accountability Office, *Defense Production Act: Opportunities Exist to Increase Transparency and Identify Future Actions to Mitigate Medical Supply Chain Issues*, GAO-21-108, November 19, 2020, at <https://www.gao.gov/assets/720/710806.pdf>; and Correspondence with GAO, November 20, 2020.

¹⁹³ Federal Emergency Management Agency, "Meeting to Develop Pandemic Response; Voluntary Agreement," 85 *Federal Register* 28031, May 12, 2020, at <https://www.federalregister.gov/documents/2020/05/12/2020-10221/meeting-to-develop-pandemic-response-voluntary-agreement>.

¹⁹⁴ Regulations.gov, *Meeting to Develop Pandemic Response; Voluntary Agreement*, May 2020, at <https://www.regulations.gov/docket?D=FEMA-2020-0016>.

On August 17, 2020, the final text of the voluntary agreement, having taken 34 comments into account, was published in the *Federal Register*.¹⁹⁵ As required under Section 708(c)(2) of the DPA, the voluntary agreement was certified by the Attorney General (in consultation with the Chairperson of the Federal Trade Commission) that the purpose of the voluntary agreement could not be accomplished without antitrust exceptions, or without any voluntary agreement. The FEMA Administrator also certified that the voluntary agreement is necessary to help provide for the national defense. Although FEMA is currently accepting private sector interest for participating in the committee,¹⁹⁶ its specific membership, activities, and outcomes have not been made public, and are not necessarily required to be disclosed in the DPA statute.

Policy Options to Ensure Sufficient Emergency PPE Supply

Issues with domestic PPE production and distribution continue to be a challenge, and materially impact the federal government's and broader domestic capacity to respond to the ongoing COVID-19 pandemic. In response, Congress may consider various policy options to address both the informational aspects of PPE supply chain uncertainties, as well as the means to expand domestic supply and distribution. These policy options may address immediate aspects of the ongoing pandemic, and longer-term structural elements in anticipation of future public health crises or supply chain contingencies.

Federal Supply Chain Data Collection: Policy Options

The COVID-19 pandemic has highlighted limitations in the U.S. medical product supply chain, including concerns about U.S. reliance on foreign manufacturers (see **textbox**).¹⁹⁷ Absent clearer visibility into the makeup of the existing domestic supply chain, policymakers will have an incomplete or inaccurate view of existing and potential future supply chain vulnerabilities, and the means by which to remedy them.

¹⁹⁵ FEMA, "Voluntary Agreement Under Section 708 of the Defense Production Act; Manufacture and Distribution of Critical Healthcare Resources Necessary to Respond to a Pandemic," 85 *Federal Register* 50035-50040, August 17, 2020, at <https://www.federalregister.gov/documents/2020/08/17/2020-18005/voluntary-agreement-under-section-708-of-the-defense-production-act-manufacture-and-distribution-of>.

¹⁹⁶ FEMA, "Voluntary Agreement With Private Industry To Respond To Pandemics," press release, July 17, 2020, at <https://www.fema.gov/fact-sheet/voluntary-agreement-private-industry-respond-pandemics>.

¹⁹⁷ See U.S. Congress, Senate Committee on Homeland Security and Governmental Affairs, "Evaluating the Federal Government's Procurement and Distribution Strategies in Response to the COVID-19 Pandemic, Hearing, June 9, 2020.

U.S. International Trade Commission's Investigations Related to COVID-19: Market, Trade, and Supply Chain Challenges

On April 6, 2020, the Chairs of the House Committee on Ways and Means and the Senate Committee on Finance requested that the U.S. International Trade Commission (USITC) identify imported goods related to the response to the COVID-19 pandemic, their source countries, tariff classifications, and applicable rates of duty. To assist the committees and the U.S. Trade Representative (USTR) in proposing or taking appropriate and responsive actions, the Chairs asked that the USITC issue a report by April 30, 2020. The USITC released its report, "COVID-19 Related Goods, US Imports and Tariffs," to the public on May 4, 2020, and updated it on June 30, 2020, which provided trade-related information for the products identified, and tabulated import data from 2017, 2018, and 2019. Subsequently, on August 13, 2020, the committees requested a follow-on investigation. The USITC was also asked to publish a report that builds on the earlier investigation and provide more detailed information on COVID-related industry sectors and particular products identified in the commission's previous report. The new report, "COVID-19 Related Goods: The U.S. Industry, Market, Trade, and Supply Chain Challenges," is expected to be released on December 15, 2020.

The report will aim to provide an overview of key U.S. industry sectors producing pandemic-related goods, including, but not limited to, medical devices, PPE, and pharmaceuticals. The sector overviews are expected to include information on U.S. production, employment, and trade. Members asked the USITC to carry out case studies that focus on products for which there were reported shortages in the first half of 2020, including those affected by supply chain fragility, blockages, or barriers (e.g., N-95 respirators, ventilators, vaccines, and COVID-19 test kits). Some of the supply chain challenges and constraints likely to be addressed in the report include factors affecting domestic production and foreign trade barriers and restrictions.¹⁹⁸ Although a partial response to broader data concerns, the report is inherently constrained in its scope on imported COVID-19-related materials, and does not address domestic production or supply chain visibility.

Vulnerabilities regarding raw materials and inputs, such as synthetic textiles and active pharmaceutical ingredients (APIs) for PPE and other related critical medical applications, are not well recorded in official trade and domestic industry data. They might be particularly difficult to track if they originate in one country but are subsequently processed in another. While facilities that manufacture drugs and medical devices for the U.S. market generally are required to register with the FDA, the agency has historically had limited data regarding the quantity produced at a specific facility, particularly with respect to raw materials or APIs.¹⁹⁹ In addition, the United States has relaxed definitions of what qualifies as a U.S. product with imported content, which may mask the extent to which domestically-produced products rely on foreign inputs.²⁰⁰

Domestic production data that more readily correlate with trade data—particularly in its timeliness and definitions—is essential to understanding the position of the U.S. economy and its industrial base in critical global supply chains. Integrated data could highlight emerging industry and supply chain shifts in specific areas that may be occurring, at least partially, in response to China's policy incentives and pressures. Moreover, it could help support or restore a strategic approach to U.S. supply chains that considers prospects and options to sustain U.S. leadership in critical sectors, such as advanced medical equipment and pharmaceutical innovation, but also essential goods such as PPE. Finally, it could enable U.S. policymakers to better understand the interplay of domestic and global developments and respond to them in timeframes closer to real

¹⁹⁸ Note: For more detail, see U.S. International Trade Commission, "Lawmakers Ask USITC to Identify Imported Products Needed for COVID-19 Response and Related Tariff and Trade Information," News Release 20-031, Investigation 332-576, April 13, 2020, and "USITC to Investigate Industry and Supply Chain Conditions Affecting COVID-19 Industry Sectors and Products," News Release 20-097, Investigation 332-580, August 21, 2020.

¹⁹⁹ FDA, Testimony of Dr. Janet Woodcock, Director the Center for Drug Evaluation and Research, "Securing the U.S. Drug Supply Chain: Oversight of FDA's Foreign Inspection Program," December 10, 2019.

²⁰⁰ The lack of statutory definitions of various terms (e.g., "manufactured" in the United States) may yield different determinations for the same product. Moreover, the "substantial transformation" test used by U.S. Customs and Border Protection (CBP) to determine a product's country of origin for trade purposes is complex, fact-specific, and thus inherently subjective in nature.

time, assess the overall production capabilities of U.S.-based producers in sectors of concern, and better prepare for and respond to future crises.

In response to these and other concerns, Congress has introduced legislation to help regulators, stakeholders, and the public better understand the medical product supply chain. The Coronavirus Aid, Relief, and Economic Security Act (CARES Act; P.L. 116-136), for example, requires HHS to contract with the National Academies of Science, Engineering, and Medicine (NASEM) to examine and report on the security of the U.S. medical product supply chain, including U.S. dependence on foreign countries for critical drugs and devices (e.g., medical PPE).²⁰¹ In addition, the CARES Act also included a provision that aims to address some of these gaps by requiring registered drug and API producers to annually report to the FDA the amount of drugs manufactured for domestic distribution. Legislation has been introduced that would expand this requirement to medical devices (including various PPE) and make the reporting quarterly.²⁰²

The CARES Act also provided the FDA explicit authority to require certain device manufacturers to report interruptions or discontinuances in manufacturing during or prior to a public health emergency, to take certain actions to mitigate shortages, and to make public a list of devices that are in shortage.²⁰³ Congress may consider requiring manufacturers of all medical devices to report actual or forecasted increases in demand to FDA that may lead to a shortage, or to report actions taken by other regulatory authorities that could affect U.S. supply (e.g., export restrictions). This may help FDA better anticipate and take steps to prevent shortages.

While medical product manufacturers are required to report various supply chain information to the FDA, this information is not required to be shared with other agencies and departments. As such, legislation has also been introduced in the 116th Congress that would require the FDA to share certain supply chain information with the HHS Assistant Secretary for Preparedness and Response (ASPR) and the DOD Assistant Secretary for Health Affairs.²⁰⁴ In another risk mitigation approach, legislation also has been introduced to require the Secretaries of HHS, Homeland Security, and DOD to individually conduct annual risk assessments of the medical product supply chain and submit those assessments to Congress.²⁰⁵ This information could be used to guide federal policy affecting the production of PPE and medical products, as well as federal acquisition efforts.

Although there may not be a single legislative solution to measure and manage supply chain dependencies and risks, Congress could consider authorizing federal agencies to collect more data on firm's activities in the United States and abroad. In the past, it has done so to monitor U.S. investment abroad as well as foreign investment in the United States.²⁰⁶ Agencies could obtain, analyze, and report specific supply chain information about the status of U.S. production and distribution without disclosing business confidential information that could prejudice firms' interests. Alternatively, Congress could also direct some agencies to collect data on federally-owned public and defense stockpiles of specified items. While this would be a more targeted effort, it might be easier to manage and provide comprehensive data more quickly and at less expense to the government.

²⁰¹ P.L. 116-136, §3101, 134 Stat. 360.

²⁰² See, for example, S. 3781 (116th Congress).

²⁰³ Section 506J of the Federal Food, Drug, and Cosmetic Act (FFDCA), as established by P.L. 116-136, §3121, 134 Stat. 363.

²⁰⁴ See, for example, S. 3781 (116th Congress).

²⁰⁵ See, for example, S. 3780 (116th Congress).

²⁰⁶ See, for example, 22 U.S.C. §§3101-3108.

HHS: Policy Options

The lack of transparency in the medical product supply chain and perceived reliance on foreign-made medical products has been framed as a national security issue. To this end, legislation has been introduced to increase domestic production or reserves of critical medical products. As mentioned, some bills would impose additional reporting requirements on medical product manufacturers, while others would direct HHS to conduct studies or risk assessments of the medical product supply chain.

Some bills would direct HHS or its offices to develop a list of critical medical products and incentivize domestic manufacturing of those products. For example, S. 3780, the Help Onshore Manufacturing Efficiencies for Drugs and Devices Act (HOME Act), would create within HHS a Center for Domestic Advanced Manufacturing of Critical Drugs and Devices to support, through grants and loans, domestic manufacturing of critical drugs and devices using advanced technologies. While FDA has identified and published a list of essential medical supplies and critical inputs, the agency cannot compel firms to make the products on this list. However, Congress may consider legislation to require or incentivize their domestic production.²⁰⁷

Given that the PPE issue is largely a question of supply and distribution, Congress may consider expanding HHS' role to strengthen and reform the SNS, and to support national stockpiling more broadly. Though it is not its primary or traditional domain, Congress also may consider directing HHS to play a supporting role for national production alongside or, in lieu of, DPA authorities.

Stockpile Policy Options

The COVID-19 pandemic response quickly depleted both federal and nonfederal stockpiles of PPE. Congress might consider policies to bolster stockpiling efforts to ensure adequate PPE emergency supplies.

Federal Strategic National Stockpile

The precise role the Strategic National Stockpile is to play in responding to public health emergencies is not defined in statute and remains subject to administrative interpretation. Since its inception in 1999, the mission of the stockpile has expanded from providing unique federal assets to respond to biological or chemical attacks, and has developed to now include marshaling material responses to natural disasters and emerging infectious diseases. The current authorizing language states the HHS Secretary

... shall maintain a stockpile or stockpiles of drugs, vaccines and other biological products, medical devices, and other supplies (including personal protective equipment, ancillary medical supplies, and other applicable supplies) ... in such numbers, types, and amounts as are determined ... by the Secretary to be appropriate and practicable, taking into account other available sources, to provide for and optimize the emergency health security of the United States, including the emergency health security of children and other vulnerable populations, in the event of a bioterrorist attack or other public health emergency....²⁰⁸

The Administration has embarked on restructuring the SNS ("SNS 2.0") to focus on five priority areas:

²⁰⁷ See, for example, S. 3827, the Medical Supplies for Pandemics Act of 2020, which would direct HHS to create incentives for manufacturers to diversify geographic production of medical products for the SNS.

²⁰⁸ 42 U.S.C. §247d-6b(a).

- Replenish the SNS to include a 90-day supply of PPE,
- Refine strategy and structure to reevaluate types and quantities of supplies stockpiled,
- Establish a distribution model to improve transportation processes and geographic need determination,
- Expand the supply chain control and transparency, and
- Expand domestic manufacturing.²⁰⁹

FEMA and HHS have incorporated the need for PPE demand and supply chain visibility into proposals to enhance the SNS with titles like “Strategic National Stockpile (SNS) 2.0” or “the Next Generation SNS.”²¹⁰ In support, DLA reports that it “is now focused on reconstituting supplies, preparing for potential future requirements, and increasing the United States’ ability to test” for COVID-19.²¹¹ DLA plans to procure \$1.2 billion worth of PPE on behalf of HHS to replenish the SNS.²¹²

Congress might consider whether the Administration’s plan will sufficiently address stockpile issues. Congress could choose to wait and evaluate the sufficiency of Administration’s efforts. Alternatively, Congress could limit agency discretion by codifying the Administration’s plan, more precisely defining the SNS mission, or mandating other specific actions.

The 116th Congress has already amended the SNS authorizing statute to explicitly include PPE and to require annual threat-based inventory review and congressional reporting through the CARES Act (P.L. 116-136) and the Pandemic and All-Hazards Preparedness and Advancing Innovation Act (P.L. 116-22). Congress could further define the purpose of the stockpile to specify the appropriate relative focus on particular threats such as naturally occurring events and diseases or on chemical and biological attacks. Additionally, Congress could define the scope of the stockpile, such as whether it is to be able to entirely support domestic health care needs in the face of global supply chain collapse and how it should coordinate with nonfederal stockpiles.

Publication of PPE Procurement and Allocation Authorities and Procedures

Prior to the COVID-19 pandemic, ASPR (the HHS agency that administers the SNS) distributed SNS resources to nonfederal jurisdictions on the basis of population.²¹³ After the SNS’s PPE stores were effectively exhausted in March 2020, FEMA and HHS jointly established the National Resource Prioritization Cell (NRPC), which determined allocations of newly acquired medical supplies based on algorithms using data from private sector partners and the CDC,

²⁰⁹ HHS, *SNS 2.0: The Next Generation*, at <https://www.phe.gov/about/sns/Pages/sns-next-generation.aspx>; and GAO, *COVID-19: Federal Efforts* p.193.

²¹⁰ HHS, ASPR, “SNS 2.0: The Next Generation,” at <https://www.phe.gov/about/sns/Pages/sns-next-generation.aspx>; Gaynor testimony, House Homeland, *Examining National Response*, p. 11.

²¹¹ *Ibid.*

²¹² *Ibid.*

²¹³ This population-based SNS distribution method utilized 2010 census data. See also U.S. Centers for Disease Control and Prevention (CDC), “Receiving, Distributing, and Dispensing Strategic National Stockpile Assets: A Guide to Preparedness,” Version 11, Mar. 28, 2014, available at <https://stacks.cdc.gov/view/cdc/77036>. In 2019, ASPR determined that this existing allocation procedure would be insufficient in the face of a pandemic given the scarcity of the domestic PPE supply. Among other remedies, ASPR recommended the development of a prioritization strategy. GAO, *COVID-19: Opportunities*, pp. 106-107.

including data on PPE supply, COVID case numbers, mortality, and hospital capacity, and demographic information.²¹⁴

Some Members of Congress and state, local, territorial, and tribal officials have criticized the opacity of recent federal procurement, distribution, and allocation efforts. Common concerns include leadership roles, the sources of data used in allocation, and a lack of transparency into procedures to assess demand and allocate supplies (for a non-exhaustive list of Congressional concerns concerning PPE distribution, see “FEMA Actions—Distribution,” above).²¹⁵

Congress may consider options to clarify authorities for federal activities related to provision of critical medical supplies. In the case of COVID-19, the HHS Secretary declared a Public Health Emergency under the Public Health Service Act, which authorizes the Secretary to lead the federal public health and medical response to the declared incident.²¹⁶ The President subsequently issued declarations under both the National Emergencies Act and the Stafford Act.²¹⁷ Following the Stafford Act declarations, FEMA assumed responsibility for coordinating the federal COVID-19 response.²¹⁸ Given the simultaneous invocation of discrete emergency authorities, Congress may consider options to require the clear identification of lead federal officials responsible for aspects of PPE deployment, including acquisition, allocation, and distribution.²¹⁹

Congress could also require responsible federal officials to regularly review, revise, and publish a clear federal allocation methodology within a specific time period, particularly in cases of competing domestic demand and scarcity.²²⁰ Finally, Congress could require agencies to disclose data sources used to guide allocation decisions to Congress, nonfederal partners, and/or the public within a specific time period. These options could increase transparency and potentially improve coordination between federal and nonfederal partners.

Legislation has been introduced in recent months to increase the transparency of federal PPE distribution efforts. For example, the “Emergency Medical Supplies Procurement Act” (S. 3921 or H.R. 6791) would require executive agencies to publish data on distributions of federally-acquired PPE to states, tribes, and territories, as well as shortfalls and delays in response to requests. The “COVID-19 Emergency Medical Supplies Enhancement Act of 2020” (H.R. 6858)

²¹⁴ Gaynor and Polowczyk, HSGAC hearing, pp. 5-6; Oral Testimony, Rear Admiral John Polowczyk, *Evaluating the Federal Government’s Procurement and Distribution Strategies in Response to the COVID-19 Pandemic*, hearing, 116th Cong., 2nd sess., June 9, 2020; and FEMA, “Coronavirus (COVID-19) Pandemic: National Resource Prioritization Cell,” April 17, 2020, at <https://www.fema.gov/fact-sheet/coronavirus-covid-19-pandemic-national-resource-prioritization-cell>.

²¹⁵ Michael Bender and Rebecca Ballhouse, “How Trump Sowed COVID Supply Chaos. ‘Try Getting It Yourself,’” *Wall Street Journal*, August 31, 2020, at <https://www.wsj.com/articles/how-trump-sowed-covid-supply-chaos-try-getting-it-yourself-11598893051>.

²¹⁶ The Public Health Service Act, P.L. 78-409, codified as amended at 42 U.S.C. §§201-300mm-61; Section 2801, at 42 U.S.C. §300hh(a).

²¹⁷ See CRS Report R46326, *Stafford Act Declarations for COVID-19 FAQ*, by Elizabeth M. Webster, Erica A. Lee, and William L. Painter, and CRS Insight IN11264, *Presidential Declarations of Emergency for COVID-19: NEA and Stafford Act*, by L. Elaine Halchin and Elizabeth M. Webster.

²¹⁸ Gaynor and Polowczyk, HSGAC hearing, p. 3. For a description of the structures to lead and coordinate the federal pandemic response, see GAO, *COVID-19: Opportunities*, pp. 87-94.

²¹⁹ GAO, *COVID-19: Opportunities*, p. 65.

²²⁰ For more on stockpile and distribution transparency, see Preeti Mehrotra, Preeti Malani, and Prashant Yadav, “Personal Protective Equipment Shortages During COVID-19—Supply Chain-Related Causes and Mitigation Strategies,” *JAMA Health Forum*, May 12, 2020, at <https://jamanetwork.com/channels/health-forum/fullarticle/2766118>; and Anita Patel et al., “Personal Protective Equipment Supply Chain: Lessons Learned from Recent Public Health Emergency Responses,” *Health Security*, vol. 15, no. 2 (June 2017), pp. 244-252.

would require executive agencies to report on data models used to determine allocation of medical supplies to states during the pandemic.

Support for Nonfederal PPE Stockpiles

In addition to federal sources, the COVID-19 pandemic revealed and exacerbated PPE supply shortages among state, tribal, territorial, and local entities as well as medical providers, such as hospitals.²²¹ To address these nonfederal shortages, Congress may consider proposals to support and monitor PPE stockpiling among nonfederal partners through federal assistance programs, as well as other means.

There are several federal grant programs that nonfederal entities may use to purchase PPE supplies, prepare for medical emergencies, and build PPE stockpiles. The CDC Public Health Emergency Preparedness cooperative agreement (a form of grant) and the ASPR's Hospital Preparedness Program (HPP)²²² support state, local, and territorial public health departments and health system preparedness activities, and may support PPE procurement for stockpiling. All grantees participating in HPP are required to plan for "medical surge," including addressing any supply chain needs and vulnerabilities. Strategies may include maintaining an independent stockpile, accessing a vendor-owned stockpile, or establishing secondary vendors for medical supplies.²²³

Additionally, state, local, tribal, and territorial emergency management and homeland security agencies may receive financial assistance for the purchase of PPE through several of FEMA's preparedness grants, including Emergency Management Performance Grants, the State Homeland Security Program, the Urban Area Security Initiative, and Operation Stonegarden.²²⁴ Finally, Public Assistance funds awarded for COVID-19 may support eligible purchases of PPE supplies of up to 60 days.²²⁵

Congress may wish to consider whether to encourage the establishment of nonfederal PPE stockpiles, and whether to continue or expand federal funding for this purpose. Some scholars find that state-based stockpiles may reduce state reliance on national stockpiles in the case of a pandemic, enable states to avoid price increases associated with periods of shortages, and reduce

²²¹ For a survey of national stockpiles that may procure PPE, see CRS In Focus IF11574, *National Stockpiles: Background and Issues for Congress*, by G. James Herrera and Frank Gottron.

²²² See CDC, "CDC's Public Health Emergency Response Program: Every Response Is Local," at <https://www.cdc.gov/cpr/whatwedo/phep.htm>; and HHS, ASPR, *2017-2022 Health Care Preparedness and Response Capabilities*, November 2016, at <https://www.phe.gov/Preparedness/planning/hpp/reports/Documents/2017-2022-healthcare-pr-capabilities.pdf> (hereinafter HHS, *Health Care Preparedness and Response Capabilities*). For funding history and background on the Public Health Emergency Preparedness and Hospital Preparedness Program cooperative agreements, see CRS Congressional Distribution Memorandum, "Funding History for Public Health and Hospital Preparedness Cooperative Agreements to States," by Sarah Lister, Kavya Sekar, and Emma C. Nyhof, June 3, 2020 (available upon request from authors).

²²³ HHS, *Health Care Preparedness and Response Capabilities*, pp. 33-36.

²²⁴ FEMA, "FEMA Preparedness Grants Manual," February 2020, pp. D-6, G-5, H-15, at https://www.fema.gov/media-library-data/1581623378002-f8280c8c1ab2e38f650fe67289764826/FEMA_PreparednessGrantsManual_21320_1605_508c.pdf; and DHS, "Notice of Funding Opportunity (NOFO) Fiscal Year (FY) 2020 Homeland Security Grant Program (HSGP)," p. 32, at https://www.fema.gov/sites/default/files/2020-07/fy_2020_hsgp_nofp.pdf.

²²⁵ FEMA, "Coronavirus Pandemic Response: FEMA Releases New Policy for Declarations," Sept 1, 2020, at <https://www.fema.gov/press-release/20200901/coronavirus-pandemic-response-fema-releases-new-policy-declarations>; for additional information on Stafford Act declarations for COVID-19 see CRS Report R46326, *Stafford Act Declarations for COVID-19 FAQ*, by Elizabeth M. Webster, Erica A. Lee, and William L. Painter.

risk to essential workers during an infectious disease event.²²⁶ However, nonfederal PPE stockpiles require substantial investment and present significant challenges. Some research has identified that local, state, and regional stockpiles require substantial investment and careful management to prevent waste of expired supplies.²²⁷ Further, nonfederal stockpiles may not be easily distributed to areas of need, given their reduced geographic scope; presumably, state or local stockpiles would be controlled by the respective governments, and sharing would likely be largely voluntary. Additionally, in conceptualizing how these stockpiles may develop, consistent standards for stockpiles may encourage nationwide uniformity, but may also hinder jurisdictions' abilities to formulate supply systems and plans based on their local capacities and needs.

Should Congress wish to support nonfederal PPE stockpiles, it may consider providing additional funds to current health and emergency preparedness grant programs to account for the substantial costs involved and reduce competition for funds with other important preparedness efforts. Additionally, Congress may consider options to incentivize coordination and collaboration among states and health systems to collect, report, and share PPE inventory in order to reduce competition during periods of scarcity.²²⁸

Monitoring of Nonfederal PPE Supplies

Congress may consider proposals to establish greater federal visibility into PPE supply across the United States. Congress has long recognized the need for "public health and medical situational awareness" capabilities, including an ability to monitor health care supplies prior to and during an emergency. As a part of reauthorization in 2013, the Pandemic and All-Hazards Preparedness Reauthorization Act of 2013 (PAHPRA; P.L. 113-5) required HHS to submit a detailed strategy and implementation plan to Congress for a "situational awareness" data and information sharing network for public health emergencies. HHS plans for this system-defined situational awareness to include an ability to monitor "health system resources," and "health-related response assets."²²⁹ GAO reported that as of June 2020, HHS had made limited progress in implementing this plan.²³⁰ Specific funding to support the plan and system had not been appropriated in the years following PAHPRA; therefore, a relevant system did not exist in time for the pandemic.²³¹ As a result, federal agencies such as HHS and FEMA had to create new systems for monitoring health care supply data. For instance, as of September 2020, GAO is evaluating HHS Protect, HHS's new

²²⁶ William H. Dow, Kevin Lee, Laurel Lucia, "Economic and Health Benefits of a PPE Stockpile," *UC Berkeley Labor Center and UC Berkeley School of Public Health*, August 12, 2020, at https://laborcenter.berkeley.edu/economic-and-health-benefits-of-a-ppe-stockpile/#_ftn1.

²²⁷ Terri Rebmann et al., "Best Practices for Healthcare Facility and Regional Stockpile Maintenance and Sustainment: A Literature Review," *Health Security*, vol. 15, no. 4 (2017), pp. 409-417.

²²⁸ Ibid. and Elodie Adida, Po-Ching C. Delaurentis, and Mark Alana Lawley, "Hospital Stockpiling for Disaster Planning," *IEE Transactions*, vol. 43, no. 5 (2011), pp. 348-362. For an example of intra-state partnerships, see Lisette Voytko, "NY Will Team Up with 6 States to Buy Medical Supplies, Cuomo Says," *Forbes*, May 3, 2020, at <https://www.forbes.com/sites/lisettevoytko/2020/05/03/ny-will-team-up-with-6-states-to-buy-medical-supplies-cuomo-says/#5a155260554a>.

²²⁹ HHS Assistant Secretary for Preparedness and Response (ASPR), "The National Public Health and Medical Situational Awareness Strategy Implementation Plan (2015-2018)," 2015, at <https://www.phe.gov/about/OPP/Documents/phm-sa-ip-sept2015.pdf>.

²³⁰ GAO, *Public Health Information Technology: HHS Has Made Little Progress Toward Implementing Enhanced Situational Awareness Network Capabilities*, GAO-17-377, September 2017, p. 24, at <https://www.gao.gov/assets/690/686971.pdf>.

²³¹ Melanie Evans and Alexandra Berzon, "Why Hospitals Can't Handle Covid Surges: They're Flying Blind," *The Wall Street Journal*, September 30, 2020; and CRS analysis of Public Health and Social Services Emergency Fund (PHSSEF: account that funds ASPR) available internally at the Library of Congress.